

# **EXHIBIT F**

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# OCEAN TOMO

INTELLECTUAL CAPITAL EQUITY

ORACLE AMERICA, INC.

v.

GOOGLE INC.

CASE NO. CV 10-03561 WHA

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EXPERT REPORT OF JAMES E. MALACKOWSKI

[CORRECTED]

January 8, 2016



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## 1. FIRM BACKGROUND AND QUALIFICATIONS

1. My name is James E. Malackowski and I am the Chairman and Chief Executive Officer of Ocean Tomo. Ocean Tomo provides financial products and services related to intellectual property, including expert testimony, valuation, strategy consulting, proprietary research products, investment services, risk management products, innovation management services and transaction brokerage.
2. Prior to forming Ocean Tomo, I served as a finance and investment advisor working with one of the nation's oldest investment banks as well as one of Chicago's largest private equity firms. I began my career by spending fifteen years as a management consultant and forensic accountant focused on intangible assets. In this capacity, I served numerous roles as a founding principal including Chief Executive Officer of my prior firm.
3. I have served as a consultant for clients and counsel on business valuation issues as well as all phases of the technology transfer process. I have experience as a Board Director for leading technology corporations as well as companies dealing with brand management issues. I have served in a leadership role with numerous corporate and not-for-profit entities. I am a Past President of The Licensing Executives Society International, Inc., as well as its largest chapter, LES USA & Canada, Inc.
4. Today, I focus my non-for-profit efforts with organizations leveraging science and innovation for the benefit of children or lesser developed countries. I am a Director of Children's Memorial Research Center, an affiliate of Children's Memorial Hospital in Chicago and have served since 2002 as a Trustee or Director of Invent Now, Inc., an organization providing summer enrichment programs for more than 80,000 students annually. I am the founder of the Chicago based Center for Applied Innovation (CAI), an Illinois nonprofit corporation created to manage education, public policy outreach and related economic activity around applied technology and intellectual property rights with a focus on technology transfer to lesser developed countries.
5. I am a founding and continuous member of the IP Hall of Fame Academy. The IP Hall of Fame was developed by Intellectual Asset Management (IAM) Magazine to honor the achievements of men and women who have made an outstanding contribution to the development of today's IP system and its role as an enhancer of lives across the world. Inductees are chosen each year by the IP Hall of Fame Academy from nominations sent in by members of the global IP community.
6. I have been recognized annually since 2007 by leading industry publications as one of the fifty most influential people in intellectual property and/or one of the "World's 300 Leading IP Strategists." In 2011, I was selected by the World Economic Forum as one of fewer than twenty members of the Network of Global Agenda Councils to focus on questions of IP policy. In 2013, I was inducted into the Chicago Area Entrepreneurship Hall of Fame by the Institute for Entrepreneurial Studies at the University of Illinois at Chicago College of Business Administration.



7. I am a frequent speaker on emerging technology markets and related financial measures. I have addressed mass media audiences including Bloomberg Morning Call, Bloomberg Evening Market Pulse, Bloomberg Final Word, CNBC Closing Bell, CNBC On the Money, CNBC Street Signs, CBS News Radio, and Fox Business National Television. I have also appeared as a judge on PBS's *Everyday Edisons*.
8. On more than forty occasions, I have served as an expert in federal court or the International Trade Commission on questions relating to intellectual property economics, including the subjects of business valuation, licensing, the calculation of economic damages, the determination of profit disgorgement, the evaluation of commercial success, and the equities of a potential injunction. As an inventor, I have more than twenty issued U.S. patents. I am a frequent instructor for graduate studies on IP management and markets and a Summa Cum Laude graduate of the University of Notre Dame majoring in accountancy and philosophy. I am Certified in Financial Forensics, a Certified Licensing Professional and a Registered Certified Public Accountant in the State of Illinois. A detailed version of my curriculum vitae is attached as **Exhibit 1**.
9. Ocean Tomo is presently being compensated for my work in this matter at my current billing rate of \$795 per hour. Other Ocean Tomo consultants are assisting me in this engagement and are being compensated at rates less than \$795 per hour. No part of my compensation depends on the outcome of this dispute.

## 2. ASSIGNMENT

10. Ocean Tomo was retained by Orrick, Herrington & Sutcliffe LLP ("Orrick") counsel for plaintiff, Oracle America, Inc. ("Oracle" or "Plaintiff"), in connection with this matter in July of 2015. Ocean Tomo has been asked to evaluate the amount of monetary recovery due to Oracle for Google Inc.'s ("Google" or "Defendant") infringement of copyrights in the Java platform ("the Infringed Java Copyrights") in connection with Google's Android platform for use in mobile phones and other devices.
11. In order to accurately evaluate the measure and amount of monetary recovery due Oracle, Ocean Tomo has relied upon the following types of documents:
  - Legal filings;
  - Documents produced by Oracle;
  - Documents produced by Google;
  - Publicly available information relating to the relevant parties, market, products and platforms;
  - Prior sworn testimony of various Oracle witnesses including:



- Mr. Georges Saab, Vice President, Software Development, Java Platform Group, December 16, 2015<sup>1</sup>
- Mr. Terrence Barr, Senior Technologist and Principal Product Manager, Internet of Things Cloud Service, December 9, 2015<sup>2</sup>
- Mr. Alan Brenner, Senior Vice President Client Systems Group (former Sun employee), December 15, 2015<sup>3</sup>
- Mr. David Hofert, Senior Director, Java Business Development, December 1, 2015<sup>4</sup>
- Mr. Michael Ringhofer, Vice President, Worldwide Java Business, December 2, 2015<sup>5</sup>
- Mr. Mark Wayne, Managing Counsel of Licensing, December 3, 2015<sup>6</sup>
- Mr. Donald Smith, Senior Director of Product Management, November 20, 2015<sup>7</sup>
- Mr. Edward Senteno, Java Finance Controller, November 18, 2015<sup>8</sup>
- Mr. Vineet Gupta, Vice President, Chief Technology Officer and Chief Software Officer and Business Development General Manager (former employee), July 26, 2011<sup>9</sup>
- Mr. Jeet Kaul, Vice President Java Development Group (former employee), August 5, 2011<sup>10</sup>
- Mr. Lawrence Ellison, CEO, August 12, 2011<sup>11</sup>
- Mr. Craig Gering, Vice President Java Development (former employee), July 20, 2011<sup>12</sup>
- Dr. Mark Reinhold, Chief Architect of the Java Platform, August 5, 2011 and February 15, 2012<sup>13</sup>
- Mr. Jonathan Schwartz, former CEO of Sun, July 20, 2011<sup>14</sup>
- Prior sworn testimony of various Google witnesses including:

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<sup>1</sup> Deposition of Georges Saab, December 16, 2015, p. 35.

<sup>2</sup> Deposition of Terrence Barr, December 15, 2015, 15.

<sup>3</sup> Deposition of Alan Brenner, December 15, 2015, pp. 61 and 63.

<sup>4</sup> Deposition of David Hofert, December 1, 2015, p. 10.

<sup>5</sup> Deposition of Michael Ringhofer, December 2, 2015, p. 12.

<sup>6</sup> Deposition of Mark Wayne, December 3, 2015, p. 36.

<sup>7</sup> Deposition of Donald Smith, November 20, 2015, p. 24.

<sup>8</sup> Deposition of Edward Senteno, November 18, 2015, p. 10.

<sup>9</sup> Deposition of Vineet Gupta, July 26, 2011, p. 25.

<sup>10</sup> Deposition of Jeet Kaul, August 5, 2011, Exhibit 381.

<sup>11</sup> Larry Ellison Biography, <https://www.oracle.com/corporate/executives/ellison/index.html>

<sup>12</sup> Deposition of Craig Gering, July 20, 2011, p. 231.

<sup>13</sup> Deposition of Dr. Mark Reinhold, February 15, 2012, p. 6.

<sup>14</sup> Deposition of Jonathan Schwartz, July 20, 2011, p. 9.



- Mr. Urs Hoelzle, Sr. Vice President of Engineering, November 24, 2015<sup>15</sup>
- Mr. William Rutledge, Director of Developer Relations, December 9, 2015<sup>16</sup>
- Mr. Reto Meier, Developer Advocate, December 11, 2015<sup>17</sup>
- Mr. Jonathan Gold, Finance Director, December 11, 2015<sup>18</sup>
- Mr. Anwar Ghuloum, Engineering Director for Android, December 9, 2015<sup>19</sup>
- Mr. Hiroshi Lockheimer, Senior Vice President, December 8, 2015<sup>20</sup>
- Mr. Aditya Agarwal, Senior Financial Analyst for Android, April 8, 2011,<sup>21</sup> and May 10, 2012<sup>22</sup>
- Mr. Andrew Rubin, Senior Vice President of Mobile, April 5, July 27, and August 18, 2011<sup>23</sup>, and April 27, 2012<sup>24</sup>
- Mr. Larry Page, CEO of Google, August 24, 2011<sup>25</sup>
- Mr. Eric Schmidt, Chairman of Google's Executive Board, August 23, 2011<sup>26</sup>
- Ms. Susan Wojcicki, Senior Vice President of Advertising at Google, August 31, 2011<sup>27</sup>
- Deposition testimony of third party witnesses including:
  - John Duimovich, IBM Distinguished Engineer, December 21, 2015<sup>28</sup>
- Discussions with Oracle Employees including:
  - Mr. Michael Pfefferlen, Finance Director, Worldwide Software Sales
  - Dr. Mark Reinhold, Chief Architect, Java Platform Group
  - Mr. Michael Ringhofer, Vice President, Worldwide Java Business
  - Mr. Leo Cizek, Account Manager, Java Technology Licensing Group
  - Mr. Edward Senteno, Java Finance Controller

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<sup>15</sup> Deposition of Urs Holzle, November 24, 2015, p. 34 and 316.

<sup>16</sup> Deposition of William Rutledge, December 9, 2015, p. 21.

<sup>17</sup> Deposition of Reto Meier, December 11, 2015, p. 21.

<sup>18</sup> Deposition of Jonathan Gold, December 11, 2015, p. 139.

<sup>19</sup> Deposition of Anwar Ghuloum, December 9, 2015, p. 198.

<sup>20</sup> Deposition of Hiroshi Lockheimer, December 8, 2015, p. 9.

<sup>21</sup> Deposition of Aditya Agarwal, April 8, 2011, p. 6.

<sup>22</sup> Deposition of Aditya Agarwal, May 10, 2012, p. 154.

<sup>23</sup> Deposition of Andrew Rubin, August 18, 2011, p. 155.

<sup>24</sup> Deposition of Andrew Rubin, April 27, 2012, p. 4.

<sup>25</sup> Deposition of Larry Page, August 24, 2011, p. 7.

<sup>26</sup> Deposition of Eric Schmidt, August 23, 2011, p. 7.

<sup>27</sup> Deposition of Susan Wojcicki, August 31, 2011, p. 5.

<sup>28</sup> Deposition of John Duimovich, December 21, 2015, pp. 15 – 16.



- Mr. Donald Smith, Senior Director, Product Management
  - Mr. Mark Wayne, Managing Counsel of Licensing
  - Discussions with Oracle expert witnesses including:
    - Chris Kemerer, Ph.D.
    - Douglas C. Schmidt, Ph.D.
    - Robert Zeidman
  - Prior orders and opinions in this case including:
    - Order Granting In Part Motion To Strike Damage Report Of Plaintiff Expert Iain Cockburn
    - Order Granting In Part And Denying In Part Google’s Motion In Limine Number Three To Exclude Portions Of Dr. Cockburn’s Revised Damages Report
    - Order Granting In Part And Denying In Part Google’s Daubert Motion To Exclude Dr. Cockburn’s Third Report
    - *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339 (Fed. Cir. 2014)
12. A detailed listing of documents reviewed by Ocean Tomo in connection with this litigation to date is included in the footnotes to the report and/or the summary provided in **Exhibit 2**. **Exhibit 3** is a Timeline of Select Events relating to this matter. References to documents and testimony herein are meant to provide examples of supporting information, but are not intended to be a comprehensive or exhaustive listing of all known support or signify a heightened level of importance. In addition to this report, I may rely on video excerpts taken from videotaped depositions and/or demonstrative exhibits that illustrate the concepts and conclusions contained in this report. Such excerpts and/or demonstratives have not yet been prepared.
13. The opinions discussed throughout this report are based on my current understanding of the facts and circumstances surrounding this matter, my review of the produced documentation, testimony, third party and public information available to date and any underlying assumptions upon which I have relied. As such, the analyses and opinions described herein are subject to change based upon additional discovery or any other relevant development. To that point, as of the date of this report, I understand discovery is ongoing and several expert reports have yet to be filed. More specifically, I anticipate receiving a report from Google’s expert on damages that addresses issues relating to expense reduction and apportionment, among other things. As such, I anticipate filing a responsive report relating to those issues, consistent with the overall case schedule entered by the Court.
14. In connection with my work in this matter, I have assumed the Infringed Java Copyrights are copyrightable and have been infringed. That assumption is made exclusively for the purpose of determining the appropriate measures and amounts of monetary recovery, and in no way represents any form of legal conclusion.





### 3. SUMMARY OF OPINIONS

15. I understand Oracle is entitled to the amount of actual damages it has suffered as a result of Google's infringement, as well as any profits earned by Google which are attributable to its infringement, but not taken into account in computing Oracle's actual damages.<sup>29</sup> I understand that the Copyright Act sets forth a burden shifting approach to disgorgement of profits, whereby the plaintiff first bears the burden to identify the amount of gross revenue attributable to the infringement, and the defendant then bears the burden to establish both expense deductions and the apportionment of profits between infringing and non-infringing attributes of the accused product.
16. In offering the disgorgement opinions set forth herein, I have gone beyond the burden ordinarily required of the plaintiff and offered not only gross revenues attributable to the infringement but also those expense deductions that in my opinion are appropriate, based on the record currently available to me. I have not addressed the apportionment of those profits between infringing and non-infringing attributes of the Android Platform, but expect to do so in a further report as set out by the three-part damages report schedule in this case. Accordingly, when I refer herein to the revenues or profits attributable to the infringement, I am referring to the unapportioned revenues and/or profits that in my opinion meet the causal nexus test as I understand it as further explained herein.
17. At a minimum, Google's infringement of the Java Copyrights resulted in Oracle losing licensing revenues from third-party license agreements and also prevented Oracle (or its licensees) from launching a new mobile platform. I have quantified Oracle's lost profits from lost licensing revenues from third parties by comparing Sun's projected annual Java Platform, Micro Edition ("Java ME") licensing revenues to Oracle's actual annual Java ME licensing revenues. I then subtracted the costs and expenses Oracle would have incurred in order to generate the additional Java ME revenue. Oracle's lost profits from lost Java ME license agreements with third parties total \$475 Million. As of the date of this report, I am unable to quantify with reasonable certainty Oracle's lost profits resulting from it having been prevented from launching a new mobile operating system, nor any other component of potential loss, although I am confident that such losses in fact occurred.
18. In addition to Oracle's losses, I have also quantified the amount of profit Google realized as a result of the infringement of the Java Copyrights by the Android platform. In my opinion, some portion of those profits also reflects the uncalculated lost opportunity to Sun/Oracle to launch a new mobile platform. Google has generated Android-related revenue and profit which is attributable to the Infringed Java Copyrights, including: advertising revenues associated with Android devices; sales of Applications and Digital Content through Android Market/Google Play; and sales of Google's Nexus smartphones. As noted, although I understand Oracle is only required to present proof of the infringer's gross revenues, I have nonetheless included in my

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<sup>29</sup> 17 U.S.C. §504 – Remedies for Infringement: Damages and Profits.



analysis all of the costs and expenses which I believe should be deducted from those gross revenues, based on the information currently known to me. Therefore, I have calculated the amount of profit Google earned that is attributable to infringement of the Java Copyrights over the period of 2008 to 2015 to be \$21.27 Billion.

19. A summary of my opinions can be found in **Figure 1**.

**Figure 1**  
**Summary of Opinions**

| <b>Measure of Monetary Recovery</b> | <b>Amount<br/>(in Billions)</b> |
|-------------------------------------|---------------------------------|
| Oracle's Actual Damages             | \$0.48                          |
| Google's Android-Related Profits    | \$21.27                         |

20. Several key considerations underlying my opinions are as follows:<sup>30</sup>
- The growth of the worldwide market for wireless handheld devices from 2003 to 2015
  - The increase in Internet searches conducted from mobile devices from 2003 to 2015
  - The opportunity, presented by infringing the Java Copyrights, to tap into the Java developer community and to more quickly get the Android platform to market during a critical “mobile window.”
  - The opportunity, presented in part by infringing the Java Copyrights, to maintain and expand the Google brand by moving in a timely fashion into the market for mobile search
  - The Android-related Ad Revenues and profits Google realized from 2008 to 2015, and expects to continue to realize in the future
  - The revenues and profits Google earned and expects to continue to earn from sales of Apps and Digital Content through Android Market/Google Play
  - The substantial Research & Development (“R&D”) costs incurred by Sun and Oracle to develop and maintain the Java platform
21. The specific bases for my opinions are provided throughout the remainder of this report. As reflected in the sections that follow, my report begins with an overview of several entities which are relevant to the determination of damages. Next, I provide an overview of the litigation

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<sup>30</sup> I reserve the right to further refine my opinion upon further review of the records and consideration of the facts of this case.



history to date and describe how Google's actual and expected business performance for Android has significantly evolved over time.

22. The introductory sections lead into a detailed discussion of certain background facts, which provide the foundation necessary to determine and calculate lost profits and disgorgement in this matter. That background discussion begins with a description of the copyrighted works, including the Java platform and then moves to the evolution of the mobile industry and Google's corresponding mobile business strategy. Through that discussion, I establish that Google had a significant need, at a specific time, for a mobile platform which could be leveraged to capitalize on the seismic shift from desktop to mobile computing. In connection with that discussion, I describe the broad market reach Android has obtained, including the establishment of a vast developer community, as well as OEM and carrier involvement. I also discuss the importance of the Android platform to Google's mobile strategy and discuss the importance of the Infringed Java Copyrights to the Android platform.
23. Finally, I address Oracle's actual damages by considering what Oracle would have earned "but-for" Google's infringement. On that point, I conclude that Oracle has lost profits on several fronts including, but not necessarily limited to, a reduction in Java ME licensing revenue and a failed effort to develop a mobile platform. In addition to Oracle's losses, I address the profits Google has made through its improper use of the Infringed Java Copyrights. In connection with performing that analysis, I have identified and quantified the Android related revenues which are attributable to the infringement of the Java Copyrights, as well as the costs and expenses that actually helped generate those revenues (although that burden typically falls to the Defendant). Finally, I provide an opinion regarding Oracle's statutory damages.

#### 4. THE RELEVANT ENTITIES

##### 4.1 Sun Microsystems, Inc. ("Sun")

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24. Sun Microsystems Inc., was incorporated in February 1982 in California.<sup>31</sup> Sun completed an initial public offering in 1986. Until August 2007, Sun's equity securities were traded on the NASDAQ stock exchange under the ticker symbol "SUNW," which stood for Stanford University Network Workstation. Sun's ticker symbol was changed to "JAVA" in August 2007 to reflect the popularity of Sun's Java software platform.<sup>32</sup>
25. On April 19, 2009, Sun entered into an agreement whereby Oracle Corporation would acquire all of Sun's common stock, and Sun would become a wholly owned subsidiary of Oracle ("the 2010

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<sup>31</sup> Sun was later reincorporated in Delaware. Sun 2009 Form 10-K, p. 3.

<sup>32</sup> Sun Microsystems to Change Ticker Symbol to JAVA, <http://www.eweek.com/c/a/IT-Infrastructure/Sun-Microsystems-to-Change-Ticker-Symbol-to-JAVA>.



Sun/Oracle Merger”).<sup>33</sup> The 2010 Sun/Oracle Merger closed in January 2010,<sup>34</sup> and Sun was renamed Oracle America, Inc.

26. Prior to the 2010 Sun/Oracle Merger, Sun was a leading developer of enterprise and network computing products and technologies, operating in the computer systems, storage, and services markets, including hardware and software products.<sup>35</sup> As of 2006, Sun described its business strategy as providing “superior offerings that rely on innovation as a core differentiator.”<sup>36</sup> According to Sun, the Java software platform was one of its primary R&D investments:

*“In order to maintain our position as a leading developer of enterprise and network computing products and technologies, we must continue to invest and innovate. Over the past few years, in addition to significant investments in research and development, we have also made significant investments in several products and services technology acquisitions. Our investments in research and development and acquisitions include the following . . .*

*The cross-platform Java software development environment, spanning smart cards, cellular handsets, set top boxes, desktops, computers and servers, provides our customers and [independent software vendor] ISV partners with an end-to-end architecture that extends our common Java™ technology-based programming environment across many different platforms, making real the concept of “Write Once, Run Anywhere.” Our products provide exceptional price-performance, flexibility, scalability and choice for devices as small as smart cards and cell phones up through large, multi-million dollar systems.”<sup>37</sup>*

27. Sun developed the Java platform for computer programming. It was released in 1996.<sup>38</sup> As of 1996, the Java platform had eight API Packages of pre-written programs.<sup>39</sup> According to Sun:

*“In fiscal 1996, the Company established a new operating division that is chartered to develop, market and support Java, a robust, object-oriented, secure programming language. The Java Application Environment (“JAE”) is one of the first widely accepted application environments to enable the platform – independent development of application software. In fiscal 1996, Sun licensed JAE to over thirty computer and software companies, including several high volume operating system vendors. These vendors plan to integrate JAE into their operating systems so that applications written in Java will run on their systems.”<sup>40</sup>*

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<sup>33</sup> Sun 2009 Form 10-K, p. 3.

<sup>34</sup> <http://www.oracle.com/us/corporate/press/044428>.

<sup>35</sup> Sun 2009 Form 10-K, p. 8.

<sup>36</sup> Sun 2006 Form 10-K, p. 3.

<sup>37</sup> Sun 2006 Form 10-K, p. 4.

<sup>38</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1348 (Fed. Cir. 2014).

<sup>39</sup> *Oracle America, Inc. v. Google Inc.*, 872 Fed. Supp. 2d 974, 982 (N.D. Cal. 2012).

<sup>40</sup> Sun 1996 Form 10-K, p. 4.



28. In connection with the release of Java, Sun established the Java Community Process (“JCP”) Program. The JCP is the mechanism for developing standard technical specifications for Java technology.<sup>41</sup> Through the JCP Program, anyone can participate in reviewing and providing feedback for the Java Specification Requests (“JSR”), and anyone can sign up to become a JCP Member and then participate in the Expert Group of a JSR or even submit their own JSR Proposals.<sup>42</sup>
29. In addition, Sun organized and sponsored annual JavaOne developer conferences which drew thousands of Java programmers. According to Sun, more than 6,000 attendees participated in the first JavaOne conference in 1996, and more than 10,000 developers attended the second JavaOne conference in 1997.<sup>43</sup> By 2005, the tenth anniversary of the release of Java, Sun estimated Java drove more than \$100 billion of business annually. Sun counted more than 4.5 million Java developers, 2.5 billion Java-enabled devices, and 1 billion Java technology-enabled smart cards. The Ovum market research firm estimated that more than 708 million Java-enabled handsets were in circulation by June 2005.
30. Commenting on the development of the Java platform, Mr. Vineet Gupta, the former Oracle Vice President, CTO and CSO and Business Dev. GM, indicated that “hundreds of people [at Sun] have spent 15 years creating a technology with an ecosystem that was well-balanced.”<sup>44</sup> Sun’s substantial investment in the Java platform is reflected in Sun’s annual R&D expenses. **Exhibit 4** is a summary of Sun’s R&D expenses for the fiscal years 1990 to 2009. As **Exhibit 4** illustrates, Sun incurred R&D expenses totaling more than \$24.8 billion during that 20-year period 1990 to 2009 to develop Java and its other innovative products and services.
31. Java was an important part of Sun’s success. According to Sun, the success of its software business was attributable to the “ability to attract innovative application developers to [the] Java platform and Solaris Operating System.”<sup>45</sup> According to Mr. Gupta, “I personally believe, and I think several people in Sun believed, that the last seven to ten years of Sun’s survival was because of the Java platform, not because of the servers and infrastructure they built.”<sup>46</sup>

#### 4.2 Oracle America, Inc.

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32. Oracle America, Inc. is a wholly-owned subsidiary of Oracle Corporation.<sup>47</sup> Oracle Corporation was incorporated in Delaware in 2005. Oracle Corporation is the successor to a company founded in 1977 by Mr. Larry Ellison, Mr. Richard Miner, and Mr. Ed Oates named Software

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<sup>41</sup> The Java Community Process Program, <https://www.jcp.org/en/home/index>.

<sup>42</sup> The Java Community Process Program, <https://www.jcp.org/en/home/index>.

<sup>43</sup> Java Timeline – 1995 – 2015, pp. 19 – 20.

<sup>44</sup> Deposition of Vineet Gupta, July 26, 2011, p. 338.

<sup>45</sup> Sun 2009 Form 10-K, p. 3.

<sup>46</sup> Deposition of Vineet Gupta, July 26, 2011, p. 77.

<sup>47</sup> Both Oracle Corporation and Oracle America, Inc. are sometimes referred to herein as “Oracle.”



Development Laboratories.<sup>48</sup> The company changed its name to Relational Software, Inc., and then later again to Oracle Systems.<sup>49</sup> Oracle Corporation completed its initial public offering in 1986. Its common stock was traded on the NASDAQ Global Select Market from 1986 until July 15, 2013, when it began trading on the New York Stock Exchange.<sup>50</sup>

33. In January 2010, Oracle Corporation completed the 2010 Sun/Oracle Merger and thereby acquired Sun's interest in the Java software platform in a transaction valued at approximately \$7.4 billion.<sup>51</sup> Oracle's acquisition was completed after Sun rejected a \$7.0 billion bid from IBM.<sup>52</sup> According to Oracle Corporation, "Sun's key software offerings (Java and Solaris), noted by Management as the most important technology assets that Oracle is acquiring through this acquisition, are expected to provide Oracle with strategic advantages to serve its customers."<sup>53</sup> As of 2015, Oracle still considered Java to be a "key advantage" for its business.<sup>54</sup>
34. Oracle noted that the 2010 Sun/Oracle Merger allowed Oracle to expand and enhance its customer base and services offerings.<sup>55</sup> Following the 2010 Sun/Oracle Merger, Oracle organized into three business units – software and cloud, hardware systems, and services.<sup>56</sup> Oracle generates the majority of its revenues from its software and cloud business unit, which accounted for 77 percent of Oracle's total revenues during its 2015 fiscal year.<sup>57</sup> A summary of Oracle's annual consolidated operating results for its fiscal years ending May 31, 2010 to 2015 is reflected in **Exhibit 5**.
35. Oracle currently offers solutions under "the Java technology platform, the Solaris Operating System, the MySQL database management system, Sun StorageTek storage solutions, and the UltraSPARC processor names. Its solutions are used by Internet search, social networking, entertainment, financial service, manufacturing, healthcare, and engineering companies."<sup>58</sup> Oracle has strategic partnerships and alliances with technology companies such as Advanced

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<sup>48</sup> Oracle Historical Timeline, <http://www.oracle.com/us/corporate/profit/p27anniv-timeline-151918.pdf>.

<sup>49</sup> Oracle Historical Timeline, <http://www.oracle.com/us/corporate/profit/p27anniv-timeline-151918.pdf>.

<sup>50</sup> Oracle Corporation 2014 Form 10-K, p. 32.

<sup>51</sup> *Oracle America, Inc. v. Google Inc.*, 872 F.Supp.2d 974, 975 (N.D. Cal. 2012);

<http://www.oracle.com/us/corporate/press/018363>

<sup>52</sup> <http://www.reuters.com/article/sunmicro-ibm-idUSN0639015120090406>.

<sup>53</sup> Oracle Corporation Estimation of the Fair Value of Certain Assets and Liabilities of Sun Microsystems, Inc. as of January 26, 2010, OAGOOGL0100030742 – 1130 at 756.

<sup>54</sup> Oracle Corporation 2015 Form 10-K, p. 10.

<sup>55</sup> Oracle Corporation 2010 Form 10-K, p. 11.

<sup>56</sup> Oracle Corporation 2015 Form 10-K, p. 4.

<sup>57</sup> Oracle Corporation's Fiscal Year ends on May 31<sup>st</sup> of each year. Oracle Corporation 2015 Form 10-K, p. 4.

<sup>58</sup> Technology Hardware, Storage and Peripherals Company Overview of Oracle America, Inc., *Bloomberg*, <http://www.bloomberg.com/research/stocks/private/snapshot.asp?privcapId=34903>.



Micro Devices, Inc., Fujitsu, Intel Corporation, and Hitachi Data Systems.<sup>59</sup> Oracle is based in Redwood City (now Redwood Shores), California.<sup>60</sup>

### 4.3 Google Inc.

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36. Google was incorporated in California in September 1998 and re-incorporated in Delaware in August 2003.<sup>61</sup> Google was founded by Mr. Larry Page and Mr. Sergey Brin. It is headquartered in Mountain View, California.<sup>62</sup>
37. Google's revenue has historically been "generated primarily by delivering relevant, cost-effective online advertising. Advertisers use Google's performance-based AdWords program to promote their products and services with targeted advertising. In addition, the thousands of third-party web sites that comprise the Google Network use Google's performance-based AdSense program to deliver relevant ads that generate revenue and enhance the user experience."<sup>63</sup> Advertisers use Google's Display program to promote their brands, and, although Google has failed to pay Sun/Oracle for its use of the Infringed Java Copyrights, it has historically entered into agreements with its other business partners that call for it to make payments for Android related services.
38. In 2005, Google acquired Android, Inc. as part of a plan to enter the wireless industry.<sup>64</sup> Android was formed in October 2003 by Mr. Andrew Rubin, Google's Senior Vice President of Mobile.<sup>65</sup> Google's strategy was to "acquire Android with an aggressive milestone earn-out component" due to the fact that "Android's technology could be used to embed Google into [the] fastest growing global consumer product."<sup>66</sup> In furtherance of this strategy, Google entered into agreements with:
  - Android Inc. to obtain rights to Android Inc.'s development-stage mobile operating system, and

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<sup>59</sup> Technology Hardware, Storage and Peripherals Company Overview of Oracle America, Inc., *Bloomberg*, <http://www.bloomberg.com/research/stocks/private/snapshot.asp?privcapId=34903>.

<sup>60</sup> Technology Hardware, Storage and Peripherals Company Overview of Oracle America, Inc., *Bloomberg*, <http://www.bloomberg.com/research/stocks/private/snapshot.asp?privcapId=34903>.

<sup>61</sup> Google 2014 Form 10-K, p. 48.

<sup>62</sup> About Google, <https://www.google.com/about/company/>.

<sup>63</sup> Google 2005 Form 10-K, p. 1.

<sup>64</sup> *Oracle America, Inc. v. Google Inc.*, 872 F.Supp.2d 974, 978 (N.D. Cal. 2012).

<sup>65</sup> Did you know Samsung could buy Android first, but laughed it out of court?, February 16, 2014, [http://www.phonearena.com/news/Did-you-know-Samsung-could-buy-Android-first-but-laughed-it-out-of-court\\_id52685](http://www.phonearena.com/news/Did-you-know-Samsung-could-buy-Android-first-but-laughed-it-out-of-court_id52685).

<sup>66</sup> Android, EMG M&A Review, April 18, 2005, GOOGLE-58-00048925 – 931 at 926.





- Original Equipment Manufacturers (“OEMs”) such as Samsung, HTC and LG to provide incentives to manufacture and distribute mobile devices based on the Android platform.
  - Wireless Carriers such as T-Mobile, Vodafone, NTT DoCoMo and Verizon to provide incentives to adopt the Android platform for devices compatible with their wireless networks.<sup>67</sup>
39. According to Google’s 2013 Form 10-K, today its business is “primarily focused around the following key areas: search and display advertising, the Android platform, consumer content through Google Play, enterprise, commerce and hardware products.”<sup>68</sup> In 2014 alone, Google generated \$66 billion in revenue, \$40 billion in gross profit and operating income of \$16.5 billion. On December 31, 2015, Google’s market capitalization was \$522 billion. A summary of Google’s reported annual operating results for the years ending December 31, 2008 to 2014 is reflected in **Exhibit 6**.
40. During Google’s Q3 2010 Earnings Call, Mr. Jonathan Rosenberg, Senior Vice President, Products at Google, announced that “[m]obile is on an annualized run rate of over \$1 billion. This means the people who are accessing [Google’s] products and services through their mobile phones are adding \$1 billion annually to [Google’s] existing revenue streams. Clearly, this is the future of search in the Internet, more people in more countries coming online from these smartphones. [Google’s] mobile search queries have grown five times over the past couple of years. And of course, a lot more of those queries are now coming from Android phones.”<sup>69</sup>
41. Most recently, during its Q3 2015 Earnings Call, Google announced “[t]he key highlight this quarter was the substantial growth of our mobile search revenue complemented by ongoing strong contributions from YouTube and our programmatic business... Year-on-year and quarter-on-quarter growth reflect substantial strength in mobile search due to ongoing improvement in ad formats and delivery to better address how consumers use their mobile devices.”<sup>70</sup> Further, Google announced that mobile search had surpassed desktop search worldwide, and mobile app usage and web usage is “accelerating significantly.”<sup>71</sup>

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<sup>67</sup> GOOGLE-12-00134317 (Google internal email forwarding 11/6/2007 WSJ discussing OHA announcement and Google deals with HTC, Samsung, Motorola, T-Mobile, Sprint, Nextel, NTT DoCoMo).

<sup>68</sup> Google 2013 Form 10-K, P. 3

<sup>69</sup> Google CEO Discusses Q3 2010 Results – Earnings Call Transcript, October 14, 2010, <http://seekingalpha.com/article/230158-google-ceo-discusses-q3-2010-results-earnings-call-transcript>.

<sup>70</sup> Alphabet (GOOG) Q3 2015 Results – Earnings Call Transcript, October 22, 2015, <http://seekingalpha.com/article/3596706-alphabet-goog-q3-2015-results-earnings-call-transcript>.

<sup>71</sup> Alphabet (GOOG) Q3 2015 Results – Earnings Call Transcript, October 22, 2015, <http://seekingalpha.com/article/3596706-alphabet-goog-q3-2015-results-earnings-call-transcript>.





42. A July 2015 Trefis analyst report estimated that “PC search ads and mobile search ads contribute approximately 67% to [Google’s] value.”<sup>72</sup> Trefis further reported that “[t]he mobile search ads division is the second largest division for Google and makes up approximately 34% of its total value, according to our model. Google, with 90% market share, dominates the mobile search engine market. One of the key reasons for this dominance is its flagship Android OS, which has witnessed excellent adoption and penetration in the smartphone space.”<sup>73</sup>

## 5. THE DISPUTE

### 5.1 Procedural Background<sup>74</sup>

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43. Shortly after the 2010 Sun/Oracle Merger, Oracle sued Google and accused the Android platform of infringing certain Java-related copyrights and patents.<sup>75</sup> The parties proceeded to trial in 2012.
44. At the conclusion of the trial, the jury found no patent infringement,<sup>76</sup> but found that Google had infringed certain Java Copyrights. The jury deadlocked on the issue of fair use.<sup>77</sup>
45. On May 31, 2012, the District Court issued its decision on copyrightability, finding that the replicated elements of the APIs in question – including the declaring code and the SSO – were not subject to copyright protection.<sup>78</sup> Accordingly, the District Court entered final judgment in favor of Google on Oracle’s copyright infringement claims.<sup>79</sup> Both parties appealed.<sup>80</sup>
46. On appeal, the Court of Appeals for the Federal Circuit (“the CAFC”) concluded that “the declaring code and the structure, sequence, and organization of the API Packages are entitled to copyright protection,” and reversed the opinion of the District Court “with instructions to reinstate the jury’s infringement finding as to the 37 Java packages.”<sup>81</sup> According to the CAFC, “[b]ecause the jury deadlocked on fair use, we remand for further consideration of Google’s fair use defense . . . .”<sup>82</sup>

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<sup>72</sup> Google Earnings: Profits Soars as the Company Reins in Cost, *Trefis*, July 17, 2015, p. 1.

<sup>73</sup> Google Earnings: Profits Soars as the Company Reins in Cost, *Trefis*, July 17, 2015, p. 2.

<sup>74</sup> This section is offered to place in context my understanding of the prior proceedings in connection with explaining the findings of this report to the Rule 706 expert and the Court and in connection with any *Daubert* proceedings. I do not expect to testify in front of the jury about a prior trial or appeal.

<sup>75</sup> *Oracle America, Inc. v. Google Inc.*, 872 F.Supp.2d 974, 975 (N.D. Cal. 2012).

<sup>76</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1347 (Fed. Cir. 2014).

<sup>77</sup> *Oracle America, Inc. v. Google Inc.*, 872 F.Supp.2d 974, 976 (N.D. Cal. 2012).

<sup>78</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1348 (Fed. Cir. 2014).

<sup>79</sup> Except with respect to the rangeCheck code and the eight decompiled files.

<sup>80</sup> Google appealed the District Court’s ruling with respect to the rangeCheck code and the eight decompiled files.

<sup>81</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1348 (Fed. Cir. 2014).

<sup>82</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1348 (Fed. Cir. 2014).



47. I understand the present proceedings are to determine infringement of the Java Copyrights by additional versions and extensions of the Android platform as alleged in the Supplemental Complaint, decide the issue of fair use, and to determine willfulness and the proper measure and amount of monetary recovery for the infringement of the Java Copyrights. On that point, according to the Expert Report of Robert Zeidman (“Zeidman Report”), since October 28, 2010, Google has continued to infringe Oracle’s copyrights in the Java platform. Since then, Google has released the following seven infringing versions of the Android platform:
- Gingerbread (released December 2010)
  - Honeycomb (released February 2011)
  - Ice Cream Sandwich (released October 2011)
  - Jelly Bean (released July 2012)
  - KitKat (released October 2013)
  - Lollipop (released November 2014)
  - Marshmallow (released October 2015)<sup>83</sup>
48. According to the Zeidman Report and the Expert Report of Chris Kemerer Ph.D. (“Kemerer Report”), these Android releases copy thousands of lines of source code from the Java platform, as well as the structure, sequence and organization (“SSO”) of that platform as reflected in the 37 Java API Packages.”<sup>84</sup> I understand that the scope of Android’s utilization of the Java platform has regularly increased with the introduction of each new version of Android.<sup>85</sup> In the Supplemental Complaint, Oracle asserts, in part, that:
- Android will still not work without the Infringed Java Copyrights<sup>86</sup>
  - Android has become the most widely used mobile platform in the world<sup>87</sup>
  - There are over one billion active monthly Android users and more than 8,000 different devices running versions of Android<sup>88</sup>
  - Users have downloaded more than 50 billion applications from Google Play<sup>89</sup>

## 5.2 The Evolution of Google’s Android Business

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49. Any assessment of monetary recovery must consider Google’s complete scope of use of the Infringed Java Copyrights. To that point, since the 2011/2012 time period, the use of the

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<sup>83</sup> Expert Report of Robert Zeidman, January 8, 2016, pp. 3 – 4.

<sup>84</sup> Expert Report of Robert Zeidman, January 8, 2016, pp. 10 – 11; Expert Report of Chris F. Kemerer, January 8, 2016, p. 6.

<sup>85</sup> Expert Report of Chris F. Kemerer, January 8, 2016, pp. 15 – 16

<sup>86</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 1.

<sup>87</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 2.

<sup>88</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 3.

<sup>89</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 3.



Android platform has increased exponentially. For example, as of December 2011, 314.3 million Android devices had been sold worldwide. Since 2011, an additional 3.8 billion Android devices have been sold worldwide. **Figure 2** below illustrates the difference between Android worldwide unit sales during the four-year period 2008 to 2011, and Android worldwide unit sales during the four-year period 2012 to 2015.

**Figure 2**  
**Comparative Analysis of Android Unit Sales<sup>90</sup>**

| (in thousands)      | <u>2008</u> | <u>2009</u>  | <u>2010</u>   | <u>2011</u>    | <u>Total</u>   |
|---------------------|-------------|--------------|---------------|----------------|----------------|
| Android Phones      | -           | 6,798        | 67,225        | 219,440        | 293,463        |
| Android Tablets     | -           | -            | 2,786         | 18,030         | 20,816         |
| Total Android Units | <u>-</u>    | <u>6,798</u> | <u>70,011</u> | <u>237,470</u> | <u>314,279</u> |

| (in thousands)      | <u>2012</u>    | <u>2013</u>    | <u>2014</u>      | <u>2015</u>      | <u>Total</u>     |
|---------------------|----------------|----------------|------------------|------------------|------------------|
| Android Phones      | 451,621        | 761,288        | 1,004,675        | 1,133,616        | 3,351,200        |
| Android Tablets     | 53,341         | 120,961        | 154,700          | 139,800          | 468,803          |
| Total Android Units | <u>504,962</u> | <u>882,249</u> | <u>1,159,375</u> | <u>1,273,416</u> | <u>3,820,003</u> |

50. During the period of Android's launch through December 2011, Google had realized Android-related revenues of \$881.2 million. According to Google's then-CEO Eric Schmidt (reporting to Google's Board of Directors), Android reached "escape velocity" only in the latter half of 2010<sup>91</sup>, and my calculation of Android profits by the end of 2011 as expressed herein is negative. Therefore, the Android business the Court heard about during the first trial was a business just leaving its infancy.
51. Google, however, always had a much longer range plan for Android. As described in greater detail herein, Google did not expect that strategy to come to fruition until 2012.<sup>92</sup> Its expectations were more than met. Since 2011, Google has realized additional Android-related revenues of \$39.7 Billion. **Figure 3** below illustrates the difference between Google's Android-related revenues realized during the four-year period 2008 to 2011, and Google's Android-related revenues realized during the four-year period 2012 to 2015.

<sup>90</sup> See Exhibit 9.

<sup>91</sup> GOOGLE-22-00481881-884 at 882.

<sup>92</sup> Trial Exhibit 1061-GOOGLE-21-00008116 – 139 at 131.



**Figure 3**  
**Comparative Analysis of Android-Related Revenues<sup>93</sup>**

| <i>(in millions)</i> | <b>2008</b>  | <b>2009</b>   | <b>2010</b>    | <b>2011</b>    | <b>Total</b>   |
|----------------------|--------------|---------------|----------------|----------------|----------------|
| Ads                  | \$0.7        | \$15.7        | \$120.1        | \$569.4        | \$705.9        |
| App Sales            | N/A          | 1.1           | 8.0            | 36.2           | 45.3           |
| Digital Content      | N/A          | 0.0           | 0.0            | 14.8           | 14.8           |
| Hardware             | N/A          | 0.0           | 115.2          | 0.0            | 115.2          |
| <b>Total</b>         | <b>\$0.7</b> | <b>\$16.8</b> | <b>\$243.3</b> | <b>\$620.4</b> | <b>\$881.2</b> |

| <i>(in millions)</i> | <b>2012</b>      | <b>2013</b>      | <b>2014</b>       | <b>2015</b>       | <b>Total</b>      |
|----------------------|------------------|------------------|-------------------|-------------------|-------------------|
| Ads                  | \$2,152.4        | \$4,659.5        | ██████████        | ██████████        | \$28,251.2        |
| App Sales            | 136.1            | 1,435.5          | ██████████        | ██████████        | 7,926.9           |
| Digital Content      | 105.8            | 297.5            | ██████████        | ██████████        | 1,641.9           |
| Hardware             | 303.5            | 834.7            | ██████████        | ██████████        | 1,865.2           |
| <b>Total</b>         | <b>\$2,697.8</b> | <b>\$7,227.2</b> | <b>██████████</b> | <b>██████████</b> | <b>██████████</b> |

## 6. THE JAVA PLATFORM

52. Sun developed the Java programming platform and released it in the mid-1990s.<sup>94</sup> The Java platform is now deployed on a wide range of devices, including mobile devices, such as phones, tablets, e-readers and home appliances, automobiles and other products within the category of the Internet of Things (“IoT”).<sup>95</sup> The principal objective of the Java platform when it was released was to relieve computer programmers from the burden of writing different versions of their computer programs for different operating systems or devices. At Sun, and now Oracle, Java enables a programmer to “Write Once, Run Anywhere.”
53. The ability to write a program that runs across multiple operating systems or devices dramatically simplifies the development process. A programmer need not start from scratch, or even make substantial modifications, to a program once written. So, for example, a Java program can run both on a Lenovo Thinkpad and a Macbook Air, even though they use entirely different operating systems. The Java platform also preserves compatibility for the benefit of developers and end-users, in addition to protecting Sun’s and Oracle’s commercial interests.

<sup>93</sup> See Exhibit 8.

<sup>94</sup> <http://www.oracle.com/technetwork/java/javase/overview/javahistory-index-198355.html>

<sup>95</sup> Oracle's First Supplemental Responses and Objections to Google's Seventh Set of Interrogatories dated December 16, 2015, p. 3.



## 6.1 Components of the Java Platform

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54. The Java platform contains three distinct pieces: the Java Language, the Java Virtual Machine (“JVM”) and the Java APIs. The Java platform, including the Java APIs at issue in this matter, is used by developers and programmers to create and run many different programs and applications (“Apps”).

### 6.1.1 Java Programming Language

55. The Java programming language is a human-readable language that is used by developers and programmers to generate lines of computer code. Code written in a human-readable language – “source code” – is not readable by computer hardware. Only “object code,” which is not human-readable, can be used by computers. Most object code is in binary language, meaning it consists entirely of 0s and 1s. Thus, a computer program written in a programming language ordinarily has to be converted, that is, compiled, from source code into object code before it can run, or “execute.” Sometimes a computer program is converted to machine code during execution, instead of compiled beforehand, in a process referred to as “interpreting” the code.
56. The Java programming language is object-oriented, it bundles procedures, behaviors and data into “objects” that can interact with one another through specific code sequences. Code sequences for Java are categorized as either “methods” or “classes.” The Java programming language is used by developers and programmers to write methods and classes, and to create objects, which are then executed on computers and other technological devices.<sup>96</sup>

### 6.1.2 The Java Virtual Machine

57. Programs written in the Java programming language are run in an execution environment called the “Java Virtual Machine.” The Java Virtual Machine allows for portability of programs. Machine code compiled for one type of computer hardware cannot, generally, be run on a different type of hardware (such as MACs v. PCs). The Java Virtual Machine, however, allows a program written in the Java programming language to run on different types of computer hardware. This is because the Java platform uses an intermediate form of code—called bytecode—that is simpler than source code but not as simple as machine code. Source code for a particular program can be compiled into bytecode instead of machine code, and then the bytecode can be distributed to the Java Virtual Machine running on top of a wide variety of computer hardware. The Java Virtual Machine can then run the program, interpreting the bytecode into machine code compatible with the particular hardware architecture on which the virtual machine was implemented. Thus, a program written for the Java Virtual Machine can be run on any computer with a Java Virtual Machine, regardless of that computer’s underlying hardware architecture.<sup>97</sup>

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<sup>96</sup> Expert Report of Prof. Douglas Schmidt, January 8, 2016, pp. 11 – 13.

<sup>97</sup> Expert Report of Prof. Douglas Schmidt, January 8, 2016, pp. 11 – 13.



### 6.1.3 The Java APIs

58. The Java API packages are a collection of prewritten programs, written in the Java programming language, that contain classes and methods. I understand Douglas Schmidt explained “each Java API package has groups of classes and methods that perform discrete operations. These Java API packages provide valuable material that helps developers write applications more quickly. A particularly important benefit of these Java API packages is allowing developers to avoid the tedious and error-prone effort associated with writing their own classes and methods for certain behaviors.”

## 6.2 The Popularity and Success of Java

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59. The Java software platform is currently a key factor to Oracle’s continued success. According to Oracle, Java is the “computer industry’s most widely-used software development language.”<sup>98</sup> Millions of developers use Java to develop business applications, making it one of the most powerful and popular development environments in the world.<sup>99</sup> According to Oracle, Java is the basis upon which certain Oracle products and applications are built, including Oracle’s Fusion Middleware.<sup>100</sup>
60. The popularity and success of Java is driven by many different factors including, but not necessarily limited to the following.
- One of the key benefits of Java is the ability to “Write Once, Run Anywhere.”<sup>101</sup>
  - The extensive Java class libraries (Java API packages in compiled form) help programmers to more easily create high quality programs.”<sup>102</sup> “Generally, a software library provides a set of functions, classes, or other program entities that are designed to be used in a variety of programs. Once they are designed, built, and debugged, libraries make it easier to build new programs because the components provided by a library can be used directly without further programming effort. A programmer can invoke standard libraries using the APIs that specify those libraries. The APIs express the organizational scheme of the pre-written packages of code, and provide easily memorized shortcuts that accelerate the programming process.”<sup>103</sup>

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<sup>98</sup> Oracle Corporation 2015 Form 10-K, p. 10.

<sup>99</sup> Oracle Corporation 2015 Form 10-K, p. 10.

<sup>100</sup> Oracle Corporation 2015 Form 10-K, p. 10.

<sup>101</sup> How Will Java Technology Change My Life?,  
[//docs.oracle.com/javase/tutorial/getStarted/intro/changemylife.html](http://docs.oracle.com/javase/tutorial/getStarted/intro/changemylife.html).

<sup>102</sup> Expert Report of Chris F. Kemerer, January 8, 2016, p. 9.

<sup>103</sup> Trial Testimony of Joshua Bloch, Transcript Vol. 04, April 19, 2012, pp. 62-621; 633--635, 741, 744-746.



- I understand that developers and companies prefer to work with APIs with which they are familiar in order to save time and maintain efficiency.<sup>104</sup> Therefore, Sun's efforts to encourage developers to learn and use Java, coupled with its inherent appeal, created a large base of programmers who learned the Java language and APIs. Once programmers acquired familiarity with the API because it was easy to use, the investment paid off in the form of improved efficiency in developing new programs. In addition, the "write once run anywhere" character of the Java platform allowed them to avoid re-writing each program multiple times for multiple platforms.<sup>105</sup>
- Java "has become one of the world's most popular programming languages and platforms."<sup>106</sup> Many software developers use the Java programming language, as well as Java's API Packages, to write applications or "Apps" for desktop and laptop computers, tablets, smartphones, and other devices.<sup>107</sup>
- Java is actively taught in universities as part of a Computer Science curriculum and is understood by programmers worldwide. Below is a graph from TIOBE, a software research firm founded in October 2000.<sup>108</sup> The TIOBE index is an indicator of the popularity of programming languages based on the number of skilled engineers worldwide, courses and third party vendors.<sup>109</sup> According to the TIOBE Index, Java has ranked first or second in the index since at least 2001, ranked in the top three since at least 2000, and won the Language of the Year award in 2005.<sup>110</sup>

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<sup>104</sup> Expert Report of Chris F. Kemerer, January 8, 2016, p. 24.

<sup>105</sup> Reinhold Trial Transcript at p. 718-719.

<sup>106</sup> *Oracle America, Inc. v. Google Inc.*, 872 F.Supp.2d 974, 977 (N.D.Cal. 2012).

<sup>107</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1347 (Fed. Cir. 2014).

<sup>108</sup> <http://www.tiobe.com/index.php/content/company/GeneralInfo.html>

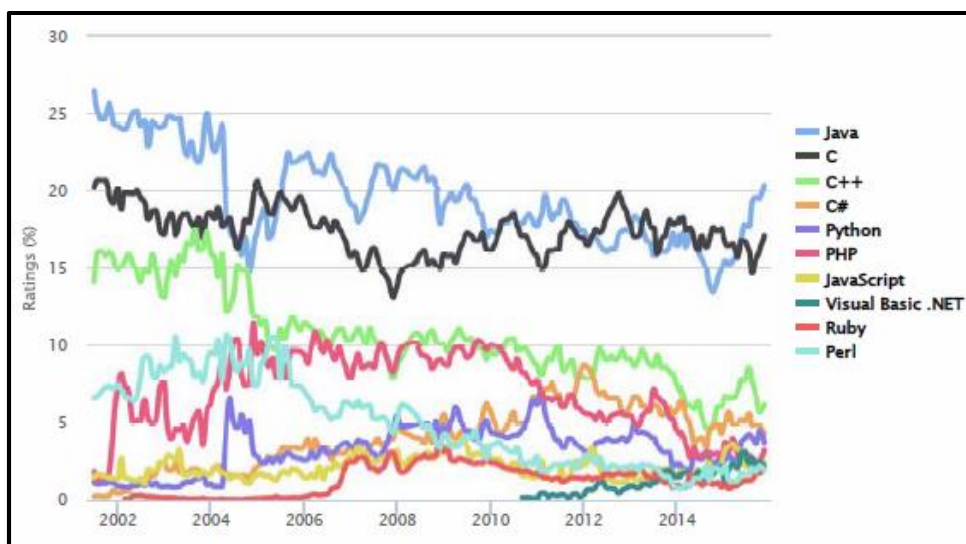
<sup>109</sup> <http://www.tiobe.com/index.php/content/paperinfo/tpci/index.html>; popular search engines such as Google, Bing, Yahoo!, Wikipedia, Amazon, YouTube and Baidu are used to calculate the ratings. The TIOBE Index is not about the *best* programming language or the language in which *most lines of code* have been written.

<sup>110</sup> TIOBE Index for September 2015, <http://www.tiobe.com/index.php/content/paperinfo/tpci/index.html>; The Java Programming Language, <https://web.archive.org/web/20110723154236/http://www.tiobe.com/content/paperinfo/tpci/Java.html>.





Figure 4  
TIOBE Index - 2002 to 2015<sup>111</sup>



- In a 2006 Google presentation concerning Android, Google estimated there were 6 million Java developers worldwide and, because of this, Google's strategy should be to "[l]everage Java for its existing base of developers."<sup>112</sup> In June 2007, Sun confirmed Google's estimation when it reported there were 6 million Java developers worldwide.<sup>113</sup> Alan Brenner, former Senior Vice President of the Client Systems Group at Sun, testified in his deposition that, in 2006, Java "had at that point the largest mobile developer community in the market by several – by a couple orders of magnitude."<sup>114</sup>

<sup>111</sup> <http://www.tiobe.com/index.php/content/paperinfo/tpci/index.html>

<sup>112</sup> Android Open Handset Platform, GOOGLE-01-00025576 – 587 at 584.

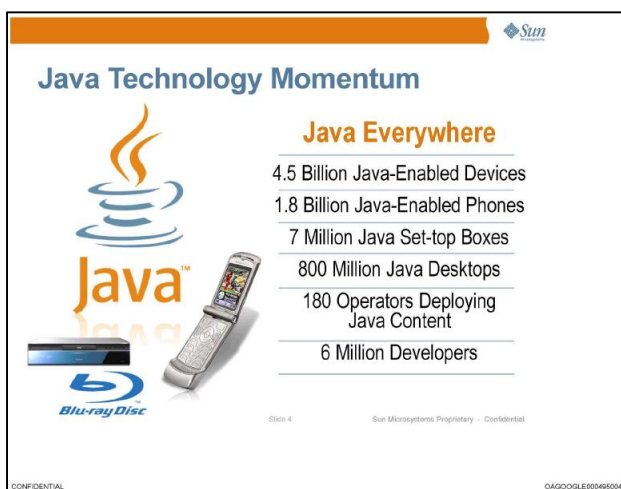
<sup>113</sup> JavaFX Mobile, June 2007, OAGOOGL0004950038 – 063 at 041.

<sup>114</sup> Deposition of Alan Brenner, December 15, 2015, p. 75





**Figure 5**  
**Java Technology Momentum – Java Use in 2007<sup>115</sup>**



- By January 2010, Oracle indicated that “Java Is Everywhere” with six billion Java-enabled devices, 1.9 billion Java-enabled phones, 180 operators deploying Java content, and six million developers.<sup>116</sup> As illustrated in **Figure 6** below, Oracle recently reported that there are 9 million Java developers worldwide.<sup>117</sup>

**Figure 6**  
**Java is Currently Everywhere – Current Java Use<sup>118</sup>**



## 7. THE EVOLUTION OF THE MOBILE INDUSTRY

<sup>115</sup> JavaFX Mobile, June 2007, OAG000LE0004950038 – 063 at 041.

<sup>116</sup> The Java Platform: The Good, the Bad and the Ugly, January 2010, OAG000LE0000144253 – 330 at 256.

<sup>117</sup> Learn about Java Technology, <https://java.com/en/about/>.

<sup>118</sup> Learn about Java Technology, <https://java.com/en/about/>.



## 7.1 The Growth of Wireless Connectivity

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61. The evolution of the mobile industry helps to explain Google's expanded scope of use and the increasing importance of the Infringed Java Copyrights to Google's business. The rapid expansion of the mobile industry also intensified the importance to Google of establishing a mobile presence, particularly in the wake of Apple's entry with the iPhone.
62. Since 1983, the wireless industry has offered U.S. consumers an array of choices among service providers, service options, technology, and equipment.<sup>119</sup> According to a Federal Communication Commission ("FCC") December 18, 2014 report,<sup>120</sup> 96.8 percent of the U.S. population lives in census blocks served by three or more mobile service operators (or "carriers"),<sup>121</sup> and U.S. mobile wireless broadband provider availability was calculated at 93.4 percent having a choice of three or more providers.<sup>122</sup>
63. The Cellular Telephone Industries Association ("CTIA") issues annual reports<sup>123</sup> that provide a comprehensive review of the results of CTIA's survey of U.S. wireless service providers.<sup>124</sup> The CTIA survey has been conducted since January 1985, originally as a cellular-only survey, and then as an all-wireless instrument.<sup>125</sup> CTIA surveys have been used to develop benchmarking information for wireless providers, and to document and demonstrate the nature of industry growth overall to policymakers.<sup>126</sup>

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<sup>119</sup> CTIA's Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry – Year-End 2014 Results, CTIA-The Wireless Association, Sept. 2015, p. 5.

<sup>120</sup> Entitled "Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services."

<sup>121</sup> FCC 14-1862, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Seventeenth Report, December 18, 2014, p. 24.

<sup>122</sup> FCC 14-1862, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Seventeenth Report, December 18, 2014, p. 26.

<sup>123</sup> Entitled "CTIA's Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry."

<sup>124</sup> CTIA's Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry – Year-End 2014 Results, CTIA-The Wireless Association, Sept. 2015, p. 1.

<sup>125</sup> CTIA's Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry – Year-End 2014 Results, CTIA-The Wireless Association, Sept. 2015, p. 11. According to the CTIA, the survey now includes the licensees holding spectrum also known as cellular, Enhanced Specialized Mobile Radio (ESMR), Personal Communications Services (PCS), Advanced Wireless Services (AWS), 700 MHz, and Broadband Radio Services. AWS is a collective term used for new and innovative fixed and mobile terrestrial wireless applications using bandwidth that is sufficient for the provision of a variety of applications, including those using voice and data (such as Internet browsing, message services, and full-motion video) content (see, FCC 05-173, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Tenth Report, September 30, 2005, p. 34).

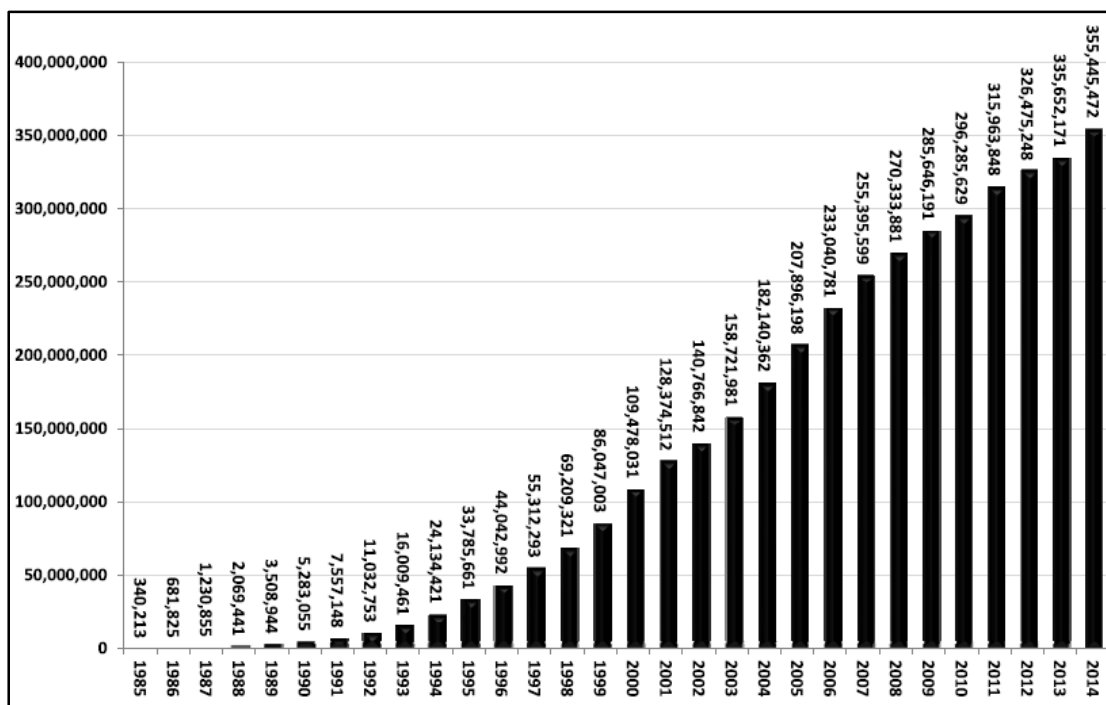
<sup>126</sup> CTIA's Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry – Year-End 2014 Results, CTIA-The Wireless Association, Sept. 2015, p. 11.



64. **Figure 7** was published by CTIA, and reflects estimated year-end total wireless connections in the U.S. for the years 1984 to 2014. As **Figure 7** illustrates, estimated total wireless connections within the U.S. increased from 340,213 in 1985 to 355.4 million by December 2014.<sup>127</sup> As **Figure 7** illustrates, as of December 31, 2004, there were an estimated 182.1 million U.S. wireless connections, and as of December 31, 2008, there were an estimated 270.3 million U.S. wireless connections.

Figure 7

## Estimated Wireless Subscriber Connections: January 1985 to December 2014



65. Further evidence of the growth in wireless connectivity is the fact that, during the year 2012, estimated U.S. wireless connections surpassed the U.S. population.<sup>128</sup> **Figure 8** below illustrates year-end penetration figures applied to the U.S. population<sup>128</sup> based on statistics from the U.S. Census. As **Figure 8** illustrates, at an estimated subscribership of 355.4 million, the 2014 penetration rate was equal to 110 percent of all Americans. Such penetration rates represent significant growth over previous rates of 61 percent as of December 2004, and 87.2 percent as of December 2008.

<sup>127</sup> CTIA's Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry – Year-End 2014 Results, CTIA-The Wireless Association, Sept. 2015, p. 24 - 25. The CTIA uses the terms “subscriber”, “subscriptions”, and “connections” interchangeably. *Id.* at p. 12.

<sup>128</sup> Inclusive of the territorial possessions of the United States.



Figure 8

U.S. Wireless Penetration Rate as Percentage of U.S. Population<sup>129</sup>

| Table 8: Wireless Penetration Rate as Percentage of U.S. Population |                             |                              |                               |
|---|-----------------------------|------------------------------|-------------------------------|
| Year-End  | U.S. Population<br>Year-End | Total Wireless<br>Population | Total Wireless<br>Penetration |
| 1991  | 259,109,574                 | 7,557,148                    | 2.9%                          |
| 1992  | 262,525,465                 | 11,032,753                   | 4.2%                          |
| 1993  | 265,833,501                 | 16,009,461                   | 6.0%                          |
| 1994  | 269,022,837                 | 24,134,421                   | 9.0%                          |
| 1995  | 272,181,546                 | 33,785,661                   | 12.4%                         |
| 1996  | 275,402,178                 | 44,042,992                   | 16.0%                         |
| 1997  | 278,659,738                 | 55,312,293                   | 19.8%                         |
| 1998  | 281,877,901                 | 69,209,321                   | 24.6%                         |
| 1999  | 285,013,107                 | 86,047,003                   | 30.2%                         |
| 2000  | 287,897,516                 | 109,478,031                  | 38.0%                         |
| 2001  | 290,691,697                 | 128,374,512                  | 44.2%                         |
| 2002  | 293,339,549                 | 140,766,842                  | 48.0%                         |
| 2003  | 295,984,212                 | 158,721,981                  | 53.6%                         |
| 2004  | 298,715,303                 | 182,140,362                  | 61.0%                         |
| 2005  | 301,499,873                 | 207,896,198                  | 69.0%                         |
| 2006  | 304,425,857                 | 233,040,781                  | 76.6%                         |
| 2007  | 307,330,930                 | 255,395,599                  | 83.1%                         |
| 2008  | 310,056,458                 | 270,333,881                  | 87.2%                         |
| 2009  | 312,997,023                 | 290,941,191*                 | 92.9%*                        |
| 2010  | 314,549,119*                | 296,285,629*                 | 94.2%*                        |
| 2011  | 316,790,638*                | 315,963,848*                 | 99.7%*                        |
| 2012  | 319,311,850*                | 326,475,248                  | 102.2%                        |
| 2013  | 321,669,712                 | 335,652,171                  | 104.3%                        |
| 2014  | 324,094,196                 | 355,445,472                  | 109.7%                        |

66. Historically, U.S. wireless penetration rates have been lower than those of other countries. **Figure 9** below reflects wireless subscribership penetration rates for several countries within North America, Europe, and Asia for certain dates during the period Q4 2002 – Q4 2011.

<sup>129</sup> CTIA's Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA  
Analyzing the U.S. Wireless Industry – Year-End 2014 Results, CTIA-The Wireless Association, Sept. 2015, p. 31.



**Figure 9**  
**Wireless Penetration Rates for Selected Countries<sup>130</sup>**

|                | Q4 2002 | Q4 2003 | Q4 2004 | Q4 2005 | Q4 2006 | Q4 2007 | Q4 2008 | Q4 2009 | Q4 2011 |
|----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| USA            | 49      | 54      | 61      | 70      | 77      | 84      | 89      | 93      | 106     |
| Canada         | 37      | 41      | 47      | 53      | 58      | 61      | 65      | 68      | 77      |
| Hong Kong      | -       | 95      | 106     | 106     | 108     | 138     | 148     | -       | -       |
| Singapore      | -       | 82      | 90      | 98      | 106     | 125     | 136     | 144     | 148     |
| United Kingdom | 85      | 91      | 104     | 113     | 117     | 122     | 126     | 129     | 123     |
| Germany        | 72      | 79      | 87      | 97      | 104     | 118     | 131     | 132     | 139     |
| Italy          | 93      | 99      | 110     | 123     | 138     | 153     | 153     | 147     | 152     |
| Sweden         | -       | -       | -       | 114     | 116     | 115     | 124     | 131     | 146     |
| France         | 63      | 68      | 74      | 79      | 79      | 89      | 92      | 96      | 99      |
| Spain          | -       | 94      | 99      | 108     | -       | -       | -       | -       | -       |
| Finland        | 85      | 92      | 95      | 101     | 114     | 122     | 128     | 144     | 171     |
| Japan          | 62      | 67      | 71      | 74      | 78      | 82      | 86      | 88      | 99      |
| South Korea    | 68      | 70      | 76      | 79      | 83      | 90      | 94      | 99      | 107     |
| Australia      | 68      | 78      | 89      | 95      | 98      | 104     | 110     | 115     | 132     |

As **Figure 9** illustrates, as of Q4 2004, the U.S. wireless penetration rate of 61 percent was well below that of Hong Kong (106 percent), The United Kingdom (104 percent), Italy (110 percent), Spain (99 percent), and Finland (95 percent). As of Q4 2007, when the U.S. penetration rate was 84 percent, eight of the fourteen countries listed in **Figure 9** had penetration rates of more than 100 percent.

## 7.2 The Growth of Mobile Data Usage and Applications

### 7.2.1 The Growth of Internet Usage in the U.S.

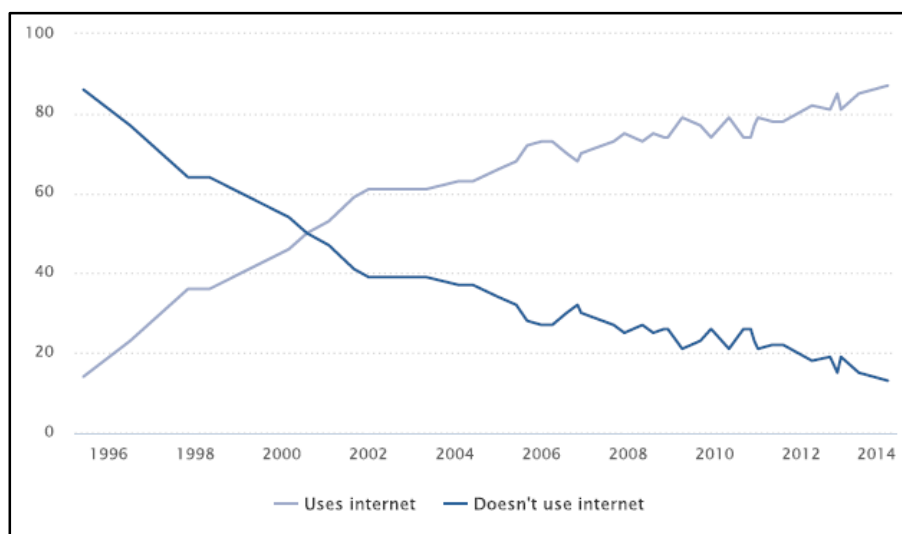
67. **Figure 10** below is a chart prepared by the Pew Research Center (“Pew”) that illustrates the annual percentages of adults in the U.S. who used the Internet during the years 1996 to 2014. According to Pew’s January 2014 survey, 87 percent of American adults used the Internet as of that time, up from 14 percent in 1995.<sup>131</sup>

<sup>130</sup> FCC 03-150 to FCC 13-34, Annual Reports and Analyses of Competitive Market Conditions with Respect to Commercial Mobile Services. The reported U.S. penetration rate for Q4 2011 of 106 percent is higher than that reported by the CTIA.

<sup>131</sup> <http://www.pewinternet.org/data-trend/internet-use/internet-use-over-time/>



**Figure 10**  
**Increase in Internet Use within the U.S.**



### 7.2.2 The Growth of Mobile Data Usage and Applications

68. Mobile devices are generally classified by their applications and features. Since at least 2002, mobile device applications and features have included paging, text messaging, information alerts, ring tones, games, exchanging digital photos, web browsing, e-mail, and access to files stored on corporate servers, among others.<sup>132</sup> According to the FCC, as of early 2003, mobile devices offered for sale within the U.S. were generally grouped into one of the five product categories reflected in **Figure 11** below.<sup>133</sup>

<sup>132</sup> FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 61.

<sup>133</sup> FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. E-5.



**Figure 11**  
**Classifications of Mobile Devices as of Early 2003<sup>134</sup>**

| Application/ Feature    | Type of Device |              |            |     |        |
|-------------------------|----------------|--------------|------------|-----|--------|
|                         | Pager          | Mobile Phone | Smartphone | PDA | Laptop |
| Voice                   |                | ✓            | ✓          |     |        |
| Paging                  | ✓              | ✓            | ✓          |     |        |
| Text Messaging          | ✓              | ✓            | ✓          | ✓   |        |
| Information Alerts      | ✓              | ✓            | ✓          |     |        |
| Ring tones & Graphics   |                | ✓            | ✓          |     |        |
| Games                   |                | ✓            | ✓          |     |        |
| Images & Video          |                | ✓            | ✓          | ✓   | ✓      |
| Web Browsing – Limited  |                | ✓            | ✓          |     |        |
| Web Browsing - Complete |                |              | ✓          | ✓   | ✓      |
| E-mail – POP3           |                | ✓            | ✓          | ✓   | ✓      |
| E-mail – corporate      |                |              | ✓          | ✓   | ✓      |
| Corporate server access |                |              | ✓          | ✓   | ✓      |
|                         |                |              |            |     |        |
| QWERTY Keypad           |                |              | ✓          | ✓   | ✓      |
| Color                   |                | ✓            | ✓          | ✓   | ✓      |

69. As **Figure 11** illustrates, as of early 2003, Internet browsing via mobile phones was generally limited to the web sites offered by content providers with which carriers had agreements.<sup>135</sup> As of early 2003, most carriers allowed wireless web users to access a variety of popular web sites and applications on their mobile devices, but did not provide access to the entire Internet.<sup>136</sup> According to the FCC, “[w]hile the specific sites available to users vary by carrier, most carriers offer at least one version of the following: news and traffic updates; weather reports; sports scores; stock quotes and financial data; movie, flight and restaurant information; and horoscopes. Other applications available to wireless web users include shopping on websites such as Amazon.com, search engines and portals, and downloadable recipes.”<sup>137</sup>

<sup>134</sup> FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. E-5.

<sup>135</sup> FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 71.

<sup>136</sup> FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 71.

<sup>137</sup> FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 71.





70. As **Figure 11** illustrates, as of early 2003, smartphones, personal digital assistants (“PDAs”) and laptop computers offered complete web-browsing.<sup>138</sup> According to the FCC, at that time,

*[W]ireless web services enable users to pull web-based information and applications from the Internet to their mobile devices. Subscribers who connect to the Internet via a wireless modem card attached to a laptop can surf the entire web using common PC browsers, such as Internet Explorer or Netscape. Users connecting via PDAs or some smartphone models were typically able to access most web sites, although some web pages may have been difficult to view given the smaller screen size and other constraints of such devices.*<sup>139</sup>

71. An estimated 35 percent of all mobile phones in use as of February 2003 were capable of web browsing, up from 21 percent in November 2002.<sup>140</sup> In March 2003, market analysts estimated that 11.9 million, or 8.4 percent of the 141.8 million U.S. mobile telephone subscribers (as of the end of 2002) subscribed to some type of mobile Internet service.<sup>141</sup> According to the FCC, at the end of 2002 in the U.S., “[a]n additional 2.3 million consumers subscribed to mobile Internet services on data-only mobile devices.”<sup>142</sup> One analyst estimated that, as of February 2003, 21 percent of web-enabled mobile phone users in the U.S., or 7.5 percent of all mobile telephone subscribers, were using their phones to browse the Internet.<sup>143</sup>
72. By 2003, handset-based mobile data applications were gaining popularity in the U.S. For example, the volume of Short Message Service (“SMS”) traffic continued to increase at a rapid pace. CTIA estimated that SMS traffic volume rose to more than 2 billion messages per month in December 2003.<sup>144</sup> By 2003, “[t]he popularity of mobile gaming also appears to have

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<sup>138</sup> FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. E-5.

<sup>139</sup> FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 71.

<sup>140</sup> FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, pp. 78 – 79 (citing to: *Eighteen Percent of U.S. Users Can’t Live Without Their Wireless Phones*, CTIA Daily News, February 24, 2003 (citing Upoc and Frank N. Magid and Associates)).

<sup>141</sup> FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 11, (citing to: Luiz Carvalho et al., *A Look at Wireless Data: Don’t Short SMS*, Morgan Stanley, Equity Research – Wireless Telcom Services, Mar. 2, 2003, at 3 (“Morgan Stanley Wireless Data Report”)).

<sup>142</sup> FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 11.

<sup>143</sup> FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, p. 71, (citing to: Tobi Elkin, *18% Would Rather Give Up TVs Than Wireless Phones*, AdAge, Feb. 24, 2003 (citing Upoc and Frank N. Magid and Associates)).

<sup>144</sup> FCC 04-216, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Ninth Report, September 28, 2004, p. 76.





increased in the past year. One analyst estimates that some 12.2 million Americans downloaded or subscribed to wireless games through their cell phone in 2003.”<sup>145</sup>

73. According to the FCC, “mobile telephone providers continued to build out their networks and expand service availability during 2005. Carriers also continued to deploy networks based on CDMA2000 1xEV-DO or WCDMA/HSDPA technologies that allow them to offer mobile Internet access services for mobile telephone handsets, PDAs, and laptops at speeds comparable to what many users get from fixed broadband connections such as DSL.”<sup>146</sup>
74. For example, in early 2005, Verizon Wireless introduced 3G handsets that could access Verizon’s EV-DO network and launched VCAST, the first wireless multimedia service in the U.S. to be provided over the next-generation network using EV-DO technology. According to the FCC:

*VCAST customers can use the new 3G handsets to access the EV-DO networks for a wide range of content, including news programming and short, made-for-mobile episodes of TV programs. For a fixed monthly fee on top of what they pay for their regular Verizon calling plan, VCAST customers get unlimited access to Verizon’s basic video news clips services and unlimited browsing of Verizon’s “Mobile Web” news and information services. Premium content is also available for an additional cost, including 3-D games, music videos, and other premium channels.*<sup>147</sup>

75. The buildout of carriers’ networks and the introduction of new technologies contributed to the growth of data subscribers in 2005. According to the FCC:
  - Based on figures reported by some of the nationwide carriers, it appears that the percentage of mobile telephone subscribers who use mobile data services has increased significantly in the past year. . . . Cingular and Verizon have reported that about a third of their customers are mobile data users, while the number of data subscribers reported by Sprint in the fourth quarter of 2004 indicates that slightly more than 40 percent of its customers are mobile data users.<sup>148</sup>
  - The results of an online market research survey designed to assess current usage of mobile data services are largely consistent with the picture emerging from the aggregate data on mobile data usage cited above. Online interviews were conducted

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<sup>145</sup> FCC 04-216, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Ninth Report, September 28, 2004, p. 76 (citing Roland Jones, Cell Phone Gaming Gathers Momentum, MSNBC, August 17, 2004 (citing Schelley Olhava, a wireless gaming analyst at market research firm IDC.))

<sup>146</sup> FCC 06-142, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eleventh Report, September 29, 2006, p. 93.

<sup>147</sup> FCC 05-173, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Tenth Report, September 30, 2005, pp. 53-54.

<sup>148</sup> FCC 05-173, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Tenth Report, September 30, 2005, p. 62.



with 1000 young consumers ranging in age from 13 to 34 in March 2005. Respondents were asked to estimate how often they used certain wireless phone features or applications in the past month.<sup>149</sup> 19 percent of respondents indicated that web browsing was a function that they performed on their phones.<sup>150</sup>

76. With the launch of wireless broadband services based on EV-DO or WCDMA/HSDPA technologies by most nationwide providers and some smaller regional providers, the number of subscribers using mobile data services at broadband-like speeds grew significantly during this time period. The FCC estimated that high-speed Internet-access connections using mobile wireless technology increased by more than 18 million in 2006, from 3.1 million connections as of December 31, 2005 to 21.9 million connections as of December 31, 2006.<sup>151</sup> As described below, this increase coincided with enormous pressure within Google to complete development of Android.
77. Based on consumer billing records, Telephia<sup>152</sup> estimates that mobile data usage reached approximately 50 percent of U.S. mobile subscribers in the fourth quarter of 2005, up from 43 percent in the first quarter of 2005.<sup>153</sup> According to Telephia, consumer billing records indicated that an estimated 41 percent of mobile subscribers used text messaging on their cellphones in the fourth quarter of 2005, 22 percent paid to access the web via their wireless device, 13 percent used multimedia messaging, and 11 percent downloaded content from their cellphones.<sup>154</sup>
78. According to a May 2008 M:Metrics report, U.S. smartphone users spent an average of four hours and 38 minutes per month browsing the mobile Web.<sup>155</sup> As of May 2008, M:Metrics estimated that mobile browsing had increased 89 percent year over year among smartphone users in the U.S., and that page views had increased 27 percent. M:Metrics concluded that social networking and Internet commerce were drawing consumers into the mobile Web, finding that,

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<sup>149</sup> FCC 05-173, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Tenth Report, September 30, 2005, p. 64.

<sup>150</sup> FCC 05-173, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Tenth Report, September 30, 2005, p. 64.

<sup>151</sup> FCC 08-28, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Twelfth Report, February 4, 2008, p. 96.

<sup>152</sup> Until acquired by the Nielson Company in June 2007, Telephia was a respected source of data about cellphone use – tracking consumers’ phone calling, mobile Web surfing, and video viewing. See, *Nielsen Adds to Cellphone Tracking*, The New York Times, June 28, 2007. [http://www.nytimes.com/2007/06/28/business/media/28adco.html?\\_r=0](http://www.nytimes.com/2007/06/28/business/media/28adco.html?_r=0)

<sup>153</sup> FCC 06-142, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eleventh Report, September 29, 2006, p. 72.

<sup>154</sup> FCC 06-142, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eleventh Report, September 29, 2006, p. 72.

<sup>155</sup> FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, pp. 100 – 101. The estimate is based on on-device metering of actual user behavior of those with Windows, Symbian and Palm handsets in March 2008.



on the days they visited each site, U.S. consumers spent an average of 22 minutes on Craigslist, 29 minutes on eBay, 16 minutes on MySpace, 14 minutes on Facebook and 18 minutes on Go.com.<sup>156</sup>

79. Wireless broadband technology continued to advance during the late 2000s. For example, LTE technology was commercially introduced in December 2009 by TeliaSonera in Norway and Sweden, and came to the U.S. in 2010.<sup>157</sup> In 2010, for example, Verizon Wireless introduced 4G LTE,<sup>158</sup> with download speeds four to five times faster than 3G networks, which rivaled some home broadband connections.<sup>159</sup>
80. The FCC relied upon data prepared by analysts at Credit Suisse First Boston (“Credit Suisse”) estimating the number of U.S. mobile wireless data subscribers and mobile wireless data penetration rates. According to these estimates, there were 180 million mobile data subscribers at the end of 2009, which translates into a penetration rate of 63 percent. **Figure 12** below is a summary of the data collected by Credit Suisse.

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<sup>156</sup> FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, pp. 100 - 101.

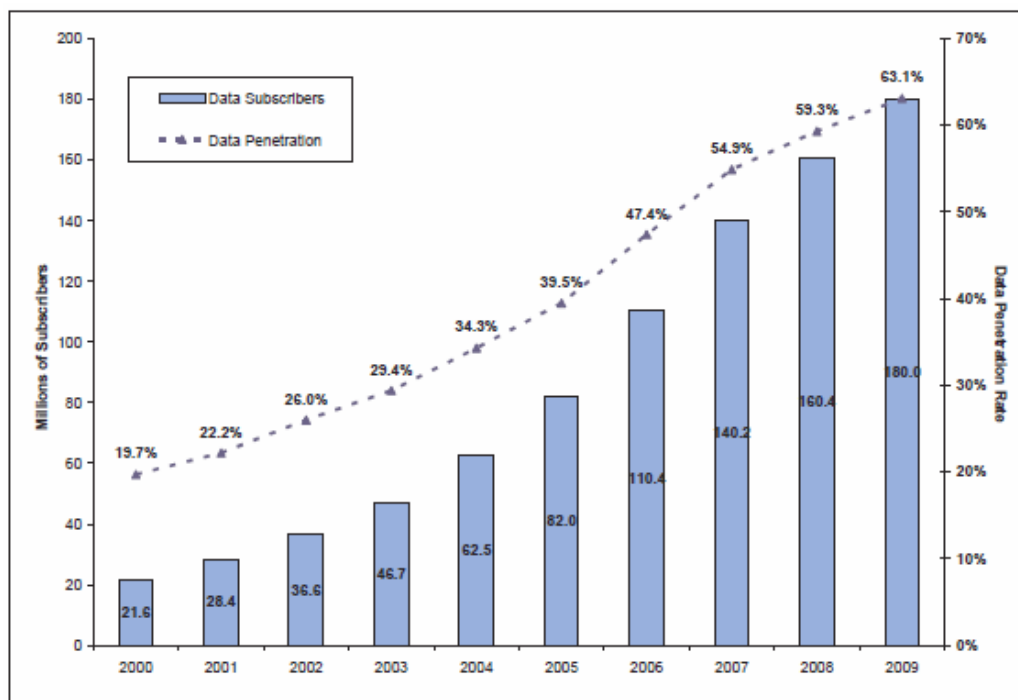
<sup>157</sup> 4G LTE: Here and Abroad, Verizon News Center, June 27, 2013.

<sup>158</sup> 4G LTE: Here and Abroad, Verizon News Center, June 27, 2013.

<sup>159</sup> What is 4G LTE and Why it Matters, Verizon News Center, April 30, 2012.



**Figure 12**  
**U.S. Data Subscribers and Data Penetration Rates<sup>160</sup>**

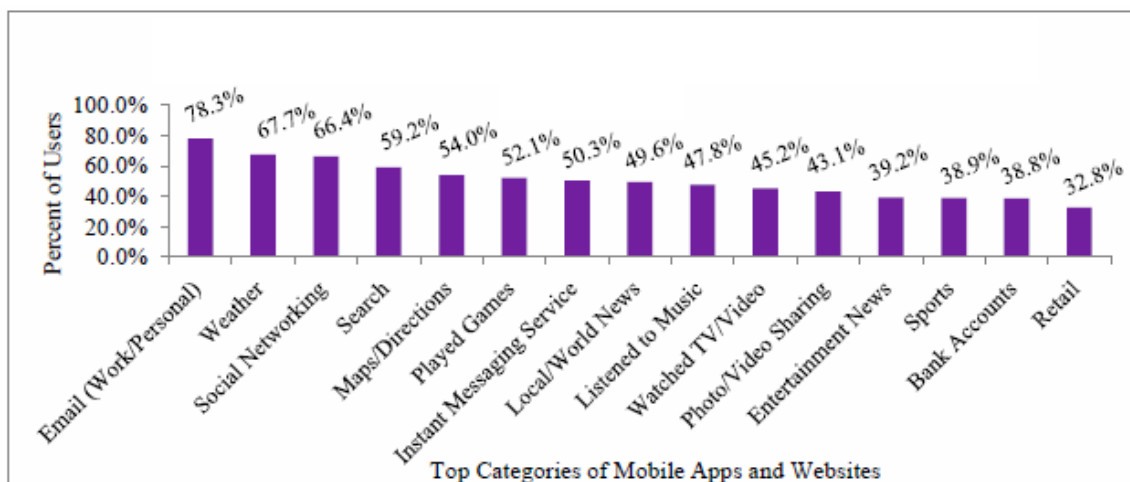


81. These newer, faster technologies likewise continued to drive demand for data-related applications. **Figure 13** below illustrates the percentages of smartphone users who accessed the 15 most popular mobile applications and websites as of August 2014. For example, **Figure 13** indicates that, as of August 2014, 67.7 percent of smartphone users accessed weather-related websites and/or applications, 59.2 percent of smartphone users conducted Internet searches, and 49.6 percent browsed local and world news through their smartphones.

<sup>160</sup> FCC 10-81, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Fourteenth Report, May 20, 2010, pp. 94 – 95 (Data provided by Credit Suisse First Boston).



**Figure 13**  
**Mobile Apps and Websites Accessed by Smartphone Users in August 2014<sup>161</sup>**



### 7.2.3 Growth of International Mobile Data Usage and Applications

82. The U.S. was initially behind other countries in Western Europe and Asia with respect to mobile penetration rates. The U.S. was also initially behind Western European countries in the adoption of 3G enabled devices, but like the wireless penetration rates, the U.S. caught up.<sup>162</sup>
83. A 2007 survey that focused exclusively on mobile web browsing behavior performed by mobile media research firm M:Metrics indicated that the percentage of mobile subscribers who use their cellphones to browse the mobile Web for news and information is slightly higher in the United States (10.7 percent) than in Europe (8.8 percent), and that a higher percentage of U.S. mobile subscribers use their cellphones for mobile web browsing in each individual category of information investigated, including sports, news, entertainment, maps and directions, financial account access, financial news, business directories and travel.”<sup>163</sup>

<sup>161</sup> FCC DA 14-1862, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Seventeenth Report, December 18, 2014, p. 43.

<sup>162</sup> FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, pp. 104, 107; <http://www.mobilemarketer.com/cms/news/research/2748.html>.

<sup>163</sup> FCC 08-28, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Twelfth Report, February 4, 2008, p. 106.



84. ComScore, Inc.<sup>164</sup> estimated that 28.4 percent of U.S. mobile subscribers had 3G devices in mid-2008.<sup>165</sup> This compares with an average of 28.3 percent of mobile subscribers in the five largest Western European countries (Germany, Spain, France, Italy and the United Kingdom).<sup>166</sup> ComScore reported that the only individual major European countries exceeding the U.S. in penetration of 3G enabled devices were Italy (38.3 percent) and Spain (37.2 percent).<sup>167</sup>
85. According to the FCC, by 2008, “[t]he percentage of mobile subscribers who use their cellphones for web browsing was slightly higher in the United States than in Western Europe, and there were broad similarities in the types of information accessed by American and Western European mobile subscribers.”<sup>168</sup>
86. Penetration of mobile data services among mobile telephone subscribers varies by country and by type of application. A July 2008 report by Nielsen Mobile (“Nielsen”) indicated that the U.S. led among 16 countries in mobile Internet penetration with 15.6 percent of wireless subscribers, followed by, among others, the United Kingdom, (12.9 percent), Italy (10.9 percent), Spain (10.8 percent), France (9.6 percent), and Germany (7.4 percent). Similarly, M:Metrics found that the percentage of mobile subscribers who use their mobile phones for certain content and applications – in particular, accessing news and information via a browser, accessing downloaded applications, purchasing ringtones, using e-mail, and accessing social networking sites – is somewhat higher in the U.S. than in other Western European countries included in the M:Metrics survey with the exception, in the case of some of these applications, of the United Kingdom. However, other mobile data applications continue to be more widely used by mobile subscribers in Western Europe than in the U.S., including phone and video messaging, watching video, and listening to music.<sup>169</sup>
87. **Figure 14** below illustrates the penetration rates of various mobile data services by country based on M:Metrics estimates for the three-month period ending March 31, 2008.<sup>170</sup>

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<sup>164</sup> comScore, Inc. is a global media measurement and analytics company that makes audiences and advertising more valuable across all screens that matter. According to comScore, it helps media buyers and sellers understand and make decisions based on how consumers use different media, such as TV, video, mobile, desktop and more. <http://ir.comscore.com/releasedetail.cfm?ReleaseID=944439>

<sup>165</sup> FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 107.

<sup>166</sup> FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 107.

<sup>167</sup> FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 107.

<sup>168</sup> FCC 08-28, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Twelfth Report, February 4, 2008, p. 10.

<sup>169</sup> FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, pp. 107 – 108.

<sup>170</sup> FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 109.



Figure 14

## Penetration Rates of Mobile Data Services by Country

Table 17: Mobile Data Penetration in the United States and Europe

|                                  | U.S.                                  | EU   | France | Germany | Italy | Spain | UK   |
|----------------------------------|---------------------------------------|------|--------|---------|-------|-------|------|
|                                  | (percent of total mobile subscribers) |      |        |         |       |       |      |
| Watched video                    | 6.0                                   | 9.2  | 7.3    | 6.2     | 11.2  | 12.8  | 9.4  |
| Listened to music                | 7.4                                   | 17.9 | 16.1   | 17.6    | 14.7  | 22.5  | 19.9 |
| Accessed news/info via browser   | 13.7                                  | 9.5  | 10.1   | 5.7     | 7.8   | 7.2   | 16.3 |
| Received SMS ads                 | 19.2                                  | 49.6 | 63.5   | 29.7    | 53.9  | 73.0  | 35.4 |
| Played downloaded game           | 9.0                                   | 8.3  | 4.4    | 7.3     | 9.0   | 11.4  | 10.3 |
| Accessed downloaded application  | 4.9                                   | 2.9  | 1.8    | 2.6     | 4.1   | 2.5   | 3.4  |
| Sent/received photos or videos   | 23.0                                  | 27.6 | 25.0   | 20.9    | 32.0  | 31.0  | 30.2 |
| Purchased ringtones              | 9.2                                   | 3.8  | 4.1    | 3.6     | 4.0   | 4.1   | 3.2  |
| Used e-mail                      | 12.6                                  | 8.6  | 6.5    | 7.2     | 11.2  | 9.1   | 9.1  |
| Accessed social networking sites | 4.8                                   | 2.8  | 2.4    | 1.3     | 2.7   | 2.5   | 4.9  |

Source M:Metrics.

88. According to the FCC, as of January 2009, mobile Internet penetration is higher in the U.S. (15.6 percent of wireless subscribers) than in Western European countries such as the United Kingdom (12.9 percent), Italy (11.9 percent), France (9.6 percent) and Germany (7.4 percent).<sup>171</sup>

#### 7.2.4 Growth in Popularity of Mobile Games and Entertainment Applications

89. During the relevant time period, the popularity of mobile games and entertainment applications also grew in the U.S. Telephia estimated that the number of mobile game buyers in the U.S. grew to 5 million in March 2006, or approximately 2.4 percent of mobile subscribers, a 44 percent increase from nearly 3.5 million in January 2006. At about that same time, Cingular reported that more than 7.5 million of its subscribers, or 14 percent of the total, browse the Internet monthly.<sup>172</sup>
90. During 2005 and 2006, entertainment applications such as ringtones and games also grew rapidly in popularity. Telephia estimated that U.S. wireless consumers downloaded more than 8.2 million games in March 2006, up 53 percent from nearly 5.4 million games in January 2006. Performance rights firm BMI estimated that U.S. retail sales of mobile phone ringtones grew to \$500 million in calendar year 2005, up from \$245 million in 2004 and \$68 million in 2003. At

<sup>171</sup> FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 107.

<sup>172</sup> FCC 06-142, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eleventh Report, September 29, 2006, p. 73.





that time, BMI expected additional music-based revenues to come from the newly launched over-the-air music downloading services. For example, since its launch at the end of October 2005, Sprint Music Store's number of over-the-air song downloads passed the two million mark in April 2006, after hitting one million downloads in February 2006.<sup>173</sup>

### 7.3 Smartphone Annual Unit Sales and Connections

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91. The development of faster wireless broadband technologies as well as the development of data-related applications by independent application developers, OEMs, and owners of mobile operating systems has driven worldwide demand for smartphones.
92. **Exhibit 10** is a summary of estimated annual worldwide smartphone unit sales by vendor<sup>174</sup> for the period 2003 through 2015. As **Exhibit 10** illustrates, during this time period, an estimated 5.5 billion smartphones were sold worldwide. As of the year ending December 2008, an estimated total of 318.1 million smartphones had been sold worldwide. Three years later (by December 2011), the total had increased nearly 300 percent<sup>175</sup> to 1.26 billion. By the end of 2015, total cumulative smartphone sales since 2003 had increased to 5.52 billion.
93. As reflected in **Exhibits 10** and **11**, during the early to mid-2000s, the worldwide market for mobile devices was dominated by products designed primarily for business use, such as Research in Motion's ("RIM") BlackBerry device, and the Palm One device. As **Exhibit 10** illustrates, from 2003 to 2011, RIM sold an estimated total 177.8 million BlackBerry devices.
94. **Exhibit 11** is a summary of estimated annual smartphone unit sales by operating system. During the period 2009 through 2015, 3.6 billion Android-operated smartphones were sold worldwide, distributed among various OEMs such as Samsung, Motorola, and LG Electronics, as well as OEMs included in the "Other" line item.
95. In addition to demand for smartphones, the development of faster wireless broadband technologies and data-related applications also drove increased worldwide demand for wireless-enabled laptops, tablets and modem connections. **Exhibit 9** is a summary of annual Android tablet unit sales for the period 2010 through 2015. According to Gartner, annual worldwide Android tablet sales increased from 2.8 million in 2010 to 53.3 million in 2012, and to 154.7 million in 2014. It is estimated that by the end of 2015, 489.6 million Android tablets would have been sold worldwide since 2010.
96. The annual increase in demand for smartphones and tablets is reflected in the number of total smartphones connected to carrier networks in the U.S. **Figure 15** below is a summary of the

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<sup>173</sup> FCC 06-142, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eleventh Report, September 29, 2006, pp. 75 - 76.

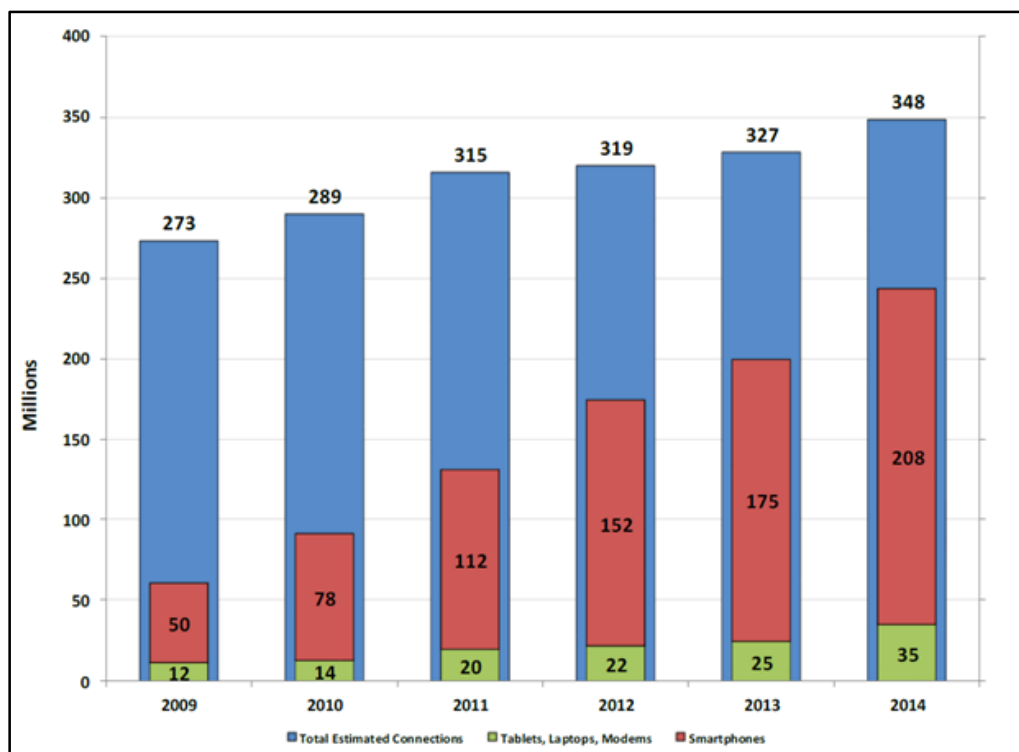
<sup>174</sup> Sometimes referred to as "OEMs."

<sup>175</sup> (Cumulative Units as of 2011 – Cumulative Units as of 2008)/Cumulative Units as of 2008 = (\$1.26 B - \$318 M)/\$318 M = 296%



estimated number of total wireless connections, smartphone connections, and wireless-enabled laptops, tablets and modem connections for the years 2009 to 2014. As **Figure 15** illustrates, annual estimated smartphone connections in the U.S. increased from 50 million as of 2009 to 208 million as of 2014.

**Figure 15**  
**U.S. Estimated Wireless Connections, Smartphones, and**  
**Wireless-Enabled Laptops, Tablets and Modems<sup>176</sup>**



#### 7.4 Mobile Operating System Worldwide Unit Sales and Market Share

97. Mobile platform developers compete within the mobile wireless ecosystem. **Figure 16** below is a summary of worldwide annual smartphone market shares by platform for the period 2003 through 2015.

<sup>176</sup> CTIA's Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry – Year-End 2014 Results, CTIA-The Wireless Association, Sept. 2015, p. 10.



**Figure 16**  
**Worldwide Smartphone Market Share by Platform**

|            | 2003   | 2004   | 2005   | 2006   | 2007   | 2008   | 2009   | 2010   | 2011   | 2012   | 2013   | 2014   | 2015   | Total  |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Windows CE | 37.7%  | 43.0%  | 47.9%  | 56.1%  | 12.0%  | 11.8%  | 8.7%   | 4.2%   | 2.1%   | 2.5%   | 3.2%   | 2.8%   | 2.1%   | 3.7%   |
| Palm OS    | 50.0%  | 36.3%  | 19.8%  | 11.7%  | 1.4%   | 1.8%   | -      | -      | -      | -      | -      | -      | -      | 0.4%   |
| RIM        | -      | -      | 21.3%  | 19.8%  | 9.6%   | 16.6%  | 19.9%  | 16.0%  | 10.9%  | 5.0%   | 1.9%   | 0.6%   | 0.3%   | 4.3%   |
| Symbian    | -      | -      | 6.7%   | 5.4%   | 63.5%  | 52.4%  | 46.9%  | 37.6%  | 18.7%  | -      | -      | -      | -      | 7.8%   |
| iPhone     | -      | -      | -      | -      | 2.7%   | 8.2%   | 14.4%  | 15.7%  | 18.9%  | 19.1%  | 15.5%  | 15.4%  | 14.6%  | 15.4%  |
| Android    | -      | -      | -      | -      | -      | -      | 3.9%   | 22.7%  | 46.4%  | 66.4%  | 78.5%  | 80.7%  | 82.7%  | 65.9%  |
| Other      | 12.3%  | 20.7%  | 4.3%   | 7.1%   | 10.7%  | 9.2%   | 6.1%   | 3.8%   | 3.0%   | 6.9%   | 0.9%   | 0.5%   | 0.3%   | 2.4%   |
| Total      | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

98. According to the FCC, during the 2002 to 2004 time period, most smartphones and PDAs utilized one of two major platforms: Palm Inc.'s PalmOS or Microsoft's Pocket PC. In addition to producing approximately 50 percent of all PDAs sold, Palm also licensed its PalmOS operating system to other handheld device and mobile telephone handset manufacturers, including Handspring, Sony, Samsung, and Kyocera. According to the FCC, "[o]ne of the major sources of demand for PalmOS products [was] the multitude of software and applications developed by third-party companies that [could] be downloaded on to PalmOS devices at little or no additional expense." During the 2002 to 2004 time period, the second major PDA platform, Pocket PC, was "similar to Microsoft Windows and all Pocket PC devices included handheld versions of most of the Microsoft Office desktop software applications."<sup>177</sup>
99. According to Gartner, in 2003, Windows CE accounted for 37.7 percent of the worldwide PDA OS [operating system] market. In 2004, Windows CE became the No. 1 PDA platform when it accounted for 43.0 percent of platform shipments. Palm slipped from 50.0 percent market share in 2003, to 36.3 percent in 2004.<sup>178</sup> **Exhibit 11** is a summary of worldwide smartphone unit sales by platform. As **Exhibit 11** illustrates, 206.2 million smartphones running the Windows CE platform were sold from 2003 through 2015 and 19.5 million smartphones running the Palm platform were sold during the years 2003 through 2008.<sup>179</sup>
100. Also according to Gartner, the RIM and Symbian platforms gained market share in 2005. In fact, the RIM platform achieved its highest share of the worldwide smartphone market at 21.3 percent in 2005. Since 2009 (when it was 19.9 percent), RIM's market share has declined steadily while the Symbian platform worldwide market share peaked at 63.5 percent in 2007, and declined to 18.7 percent by 2011.<sup>180</sup> As **Exhibit 11** illustrates, 240.1 million smartphones

<sup>177</sup> FCC 03-150, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eighth Report, July 14, 2003, pp. 76 - 77.

<sup>178</sup> Gartner: Worldwide PDA Shipments Grew 7% in 2004, Gartner Press Release, February 15, 2005.

<sup>179</sup> Exhibit 11.

<sup>180</sup> Exhibit 11.



running the RIM platform were sold from 2005 through 2015 and 433.4 million smartphones running the Symbian platform were sold during the years 2005 through 2011.<sup>181</sup>

101. Apple introduced the iPhone in 2007 and since 2009 the consumer oriented iOS platform has maintained a worldwide market share of 14.4 percent to 19.1 percent.<sup>182</sup> As reflected in **Exhibit 11**, according to Gartner, from 2007 through 2015, Apple sold 848.2 million iPhones.<sup>183</sup>
102. Since the introduction of Android in November 2008, the Android platform has consistently captured an increasing share of the worldwide smartphone market. Android's annual worldwide market share increased from 3.9 percent in 2009 to 82.7 percent in 2015.<sup>184</sup> As reflected in **Exhibit 11**, from 2009 through 2015, 3.64 billion smartphones running the Android platform have been sold worldwide.<sup>185</sup>

### 7.5 Apple Introduces the iPhone/iPad in January 2007

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103. Apple introduced the iPhone in January 2007. It was first offered for sale by AT&T in June 2007 and was "locked" to the AT&T wireless network—meaning that iPhones worked only on that network. The iPhone combined the communication function of a cellphone with the music and video features of an iPod and a web-browser that made it easy for users to browse and navigate the entire Internet.<sup>186</sup> According to the FCC, "the 2007 launch of the iPhone and 2008 launch of the iPhone 3G catalyzed the development of a new type of device in the mobile wireless ecosystem."<sup>187</sup>
104. Apple's iPhone introduction represented a fundamental departure from AT&T's walled garden business model as, before the introduction of the iPhone, the wireless carrier controlled which software was initially placed on phones activated for its network, especially feature phones. Abandoning its usual insistence that the phone come installed with its proprietary software for accessing mobile content, AT&T agreed to offer the iPhone to consumers without AT&T's own web surfing and entertainment service and its own line of games and ringtones. In addition, the

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<sup>181</sup> Exhibit 11.

<sup>182</sup> Exhibit 11.

<sup>183</sup> Exhibit 11.

<sup>184</sup> Exhibit 11.

<sup>185</sup> Exhibit 11.

<sup>186</sup> FCC 08-28, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Twelfth Report, February 4, 2008, p. 8; <http://www.engadget.com/2010/05/10/confirmed-apple-and-atandt-signed-five-year-iphone-exclusivity-de/>.

<sup>187</sup> FCC 10-81, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Fourteenth Report, May 20, 2010, p. 79.



web browser on the iPhone allowed users to browse web sites that previously did not display properly on cellphones.<sup>188</sup>

105. Initially, Apple kept tight control over the types of applications and services consumers could access on the iPhone. For example, Morgan Stanley observed that “Apple has itself created a walled garden on the iPhone in terms of branding and applications.”<sup>189</sup> In particular, Apple initially adopted a restrictive policy limiting independent software that could be used on the iPhone. This policy was greeted with heavy criticism from independent programmers, who complained that Apple was “stymieing innovation” by trying to exert excessive control over the device. On October 17, 2007, Apple reversed its policy by announcing that in February 2008 the company would release a software development kit to allow programmers to develop third-party applications for the iPhone.<sup>190</sup>
106. In July 2008, Apple introduced the 3G iPhone that ran on AT&T’s WCDMA/HSDPA network. This allowed users to navigate the Internet at much faster speeds than the original iPhone launched in June 2007. At the same time, Apple opened the App Store as an online software clearinghouse that sold third-party Apps and content developed for the iPhone using a software development kit released by Apple.<sup>191</sup>
107. According to Apple, there were about 900 applications available on the App Store as of August 2008, and 20 percent of these could be downloaded free of charge.<sup>192</sup> In the first month that the App Store was open, users downloaded more than 60 million programs for the iPhone. Apple’s then Chief Executive Steve Jobs predicted that the mobile phone of the future “will be differentiated by software.”<sup>193</sup>
108. According to the FCC, there were over 100,000 applications available from the Apple App Store as of December 2009. The number of applications downloaded from Apple’s App Store grew to

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<sup>188</sup> FCC 08-28, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Twelfth Report, February 4, 2008, p. 81.

<sup>189</sup> FCC 08-28, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Twelfth Report, February 4, 2008, p. 81.

<sup>190</sup> FCC 08-28, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Twelfth Report, February 4, 2008, p. 81; <http://www.wsj.com/articles/SB119263585523362090>.

<sup>191</sup> FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 9.

<sup>192</sup> Apple keeps 30 percent of the proceeds from sales of iPhone applications for which customers pay to download, while developers receive the remaining 70 percent (see, FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 82).

<sup>193</sup> FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 82.



over 2 billion in 2009.<sup>194</sup> By March 2012, 25 billion applications had been downloaded from the Apple App Store.<sup>195</sup>

109. Data from M:Metrics for the month of January 2008 indicated that U.S. consumers who purchased the iPhone browsed the Internet and otherwise accessed mobile content at much higher rates than those who owned other makes of smartphones as well as U.S. mobile phone subscribers in general. **Figure 17** is a summary of U.S. mobile content consumption via iPhones, other smartphones, and for the total market for January 2008.

**Figure 17**

**Percentage of Wireless Subscribers Accessing the Internet by Smartphone in 2008<sup>196</sup>**

| Activity                                  | iPhone | Smartphone | Market |
|---|--------|------------|--------|
| Any news or info via browser              | 84.8%  | 58.2%      | 13.1%  |
| Accessed web search                       | 58.6%  | 37.0%      | 6.1%   |
| Watched mobile TV and/or video            | 30.9%  | 14.2%      | 4.6%   |
| Watched on-demand video or TV programming | 20.9%  | 7.0%       | 1.4%   |
| Accessed social networking site or blog   | 49.7%  | 19.4%      | 4.2%   |
| Accessed Facebook                         | 20.0%  | NA         | 1.5%   |
| Accessed YouTube                          | 30.4%  | NA         | 1.0%   |
| Used Google Maps                          | 36.0%  | NA         | 2.6%   |
| Listened to music on mobile device        | 74.1%  | 27.9%      | 6.7%   |

110. As reflected in **Figure 17** above, as of January 2008, nearly 85 percent of iPhone users accessed news and information via a browser, as compared to about 58.2 percent of other smartphone users and compared to the market average of 13.1 percent. As **Figure 17** illustrates, M:Metrics found that nearly 31 percent of iPhone users watched mobile TV or video, versus a market average of 4.6 percent and more than double the rate for all Smartphone users (14.2 percent). In addition, nearly 50 percent of iPhone users accessed a social networking site or blog, versus 19.4 percent of Smartphone users and a 4.2 percent market average.<sup>197</sup>

## 8. GOOGLE'S MOBILE BUSINESS STRATEGY

<sup>194</sup> FCC 10-81, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Fourteenth Report, May 20, 2010, p. 173.

<sup>195</sup> FCC 13-34, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Sixteenth Report, March 21, 2013, p. 24.

<sup>196</sup> FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 98.

<sup>197</sup> FCC 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 98.



111. From at least the early 2000s, Google was concerned with the emergence and growth of the mobile wireless industry as a competitive threat for its search services, which had dominated the desktop market. Google worried about its ability to attract people who browse the Internet on mobile devices to its websites, and to protect the substantial annual advertising revenues it had achieved through Internet searches by people searching the Internet via personal computers.
112. One of Google's earliest mobile strategy documents was created in late 2004 when it evaluated opportunities to distribute its search services and applications on wireless devices.<sup>198</sup> That late 2004 wireless strategy report did not mention development of its own platform, and barely mentioned the prospect of creating its own handset.
113. According to another Google October 2004 "Wireless Strategy" report, "[t]he market is changing . . . Mobile Data Service is growing rapidly . . . Consumer Behavior has changed . . .
  - Cell Phone becomes integral part of people's life-style. . . .
  - There are more mobile users than Internet users in some regions . . . .
  - SMS, and Application Download becomes standard: In the first five months of 2004, Verizon Wireless downloaded 34 MM applications to its 40 million subscribers."<sup>199</sup>
114. Google was so concerned that it might be locked-out of the search services industry by wireless carriers such as Verizon and AT&T, or by mobile platform owners such as Apple, that its public securities filings began reflecting this risk to its business. In its 2004 10-K (which was filed on March 30, 2005), Google noted:

*"More individuals are using non-PC devices to access the Internet, and versions of our web search technology developed for these devices may not be widely adopted by users of these devices. The number of people who access the Internet through devices other than personal computers, including mobile telephones, handheld calendaring and email assistants, and television set-top devices, has increased dramatically in the past few years. The lower resolution, functionality and memory associated with alternative devices make the use of our products and services through such devices difficult. If we are unable to attract and retain a substantial number of alternative device users to our web search services or if we are slow to develop products and technologies that are more compatible with non-PC communications devices, we will fail to capture a significant share of an increasingly important portion of the market for online services."*<sup>200</sup>

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<sup>198</sup> GOOG-00580439.

<sup>199</sup> GOOGLE-87-00005644 – 697 at 546.

<sup>200</sup> Google Inc. SEC Form 10-K for the year ended December 31, 2004, pp. 57-58.





115. Google's top executives became concerned with the prospect of exclusion of its services from mobile devices.<sup>201</sup> In addition to the wireless carriers and OEMs, Google entered into agreements with Apple, RIM and other owners of mobile operating systems to have Internet traffic directed to Google websites.
116. It was imperative that Google ensure high customer adoption for its search services on iOS devices.<sup>202</sup> I believe that the terms of Google's search-distribution agreement(s) with Apple, and information regarding the total amounts paid by Google to Apple pursuant to that agreement(s) will provide significant evidence of the high value that Google placed on becoming the default search provider on mobile devices, which would further support my opinion that there is a causal link between mobile platform control and mobile advertising revenues for Google. I requested that Oracle's counsel obtain these documents and information through the discovery process, but Google has not produced responsive material. I continue to believe that such documents and information are relevant to my analysis, and I will review any responsive materials produced by Apple.<sup>203</sup>
117. Apple has always had many options available, such as Yahoo! Search, Microsoft Bing and others, and Google has long been afraid that it would be "pushed out" by Apple as the default search provider on iOS devices.<sup>204</sup> In order to ensure that did not happen, Google was, and continues to be, willing to concede a significant amount of money to secure its position as the default search provider on iOS devices. Press reports reveal that over time Google has paid billions of dollars to Apple.<sup>205</sup> It was reported in 2013 that Google paid Apple 75 cents of every one dollar of search advertising it earned via an iOS device.<sup>206</sup>
118. Mr. Gold testified that Google has a revenue sharing agreement with Apple whereby Google pays Apple roughly [REDACTED] of the Ad Revenue associated with Internet traffic from Apple's iPhone and iPad devices.<sup>207</sup> Google's documents state that in 2011, Google paid Apple at least

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<sup>201</sup> Deposition of Larry Page, August 24, 2011, pp. 77 – 78; Deposition of Urs Holzle, November 24, 2015, pp. 297 – 298.

<sup>202</sup> GOOG-00100518-523, at 519.

<sup>203</sup> I am aware that Oracle has a pending motion to compel production of Google's search-distribution agreements with Apple and other third parties. In addition to refusing to produce documents regarding such agreements, I understand that Google has also refused to testify regarding these agreements during a properly noticed Rule 30(b)(6) deposition.

<sup>204</sup> GOOG-00227828-835, at 835; GOOG-00231147-168, at 148; GOOGLE-26-00005905-912 at 906..

<sup>205</sup> "Financial Analyst Affirms Google's \$1 Billion in 'Default Search' Payments to Apple," Greg Stirling, February 11, 2013, <http://searcengineland.com/financial-analyst-affirms-googles-1-billion-in-default-search-payments-to-apple-148255>.

<sup>206</sup> "How Much Money Apple Makes From Google For Every iOS Device it Sells," Jay Yarow, February 10, 2013, <http://www.businessinsider.com/how-muc-money-apple-makes-from-goolge-for-every-ios-device-it-sells-2013-2>.

<sup>207</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 14 – 16.



- ██████████.<sup>208</sup> And Mr. Gold testified that Google paid Apple approximately ██████████ in 2014.<sup>209</sup> According to Mr. Gold, Apple received its percentage of Google's Ad Revenue when "a user does a search through the default settings on the Apple Safari browser."<sup>210</sup> Other witnesses testified that having a default search setting targeted to a specific site is preferable for receiving mobile data traffic. Practically, users rarely change the default setting for search boxes.<sup>211</sup>
119. A 96-page Google wireless strategy report dated October 26, 2004 devoted a third of a page to the "idea" of a Google handset.<sup>212</sup> By early 2005, however, Google was considering a suitable acquisition. In December 2004 or January 2005, there was a meeting between Google President Larry Page and Android Founder Andy Rubin.<sup>213</sup> By March, Google was considering an investment in, or acquisition of, Android or another mobile software provider.<sup>214</sup> By April, the Executive Management Group of Google undertook a deal review to acquire Android.<sup>215</sup> Around that same time, reports indicate that a high-level Apple engineer began working on the iPhone in late 2004, and that Apple greenlighted the product in early 2005.<sup>216</sup>
120. After acquiring Android in June 2005, Google exerted intense pressure on the Android team to move rapidly to introduce a mobile platform.<sup>217</sup> Android was segregated from the rest of the company as a "skunkworks."<sup>218</sup> There was a drumbeat of news in 2005 and 2006 regarding the increasing migration to mobile devices and the increasingly intense nature of usage of those devices. Google viewed Yahoo! and Microsoft as its principal competitors worldwide.<sup>219</sup> Additionally, Google was also concerned with Facebook.<sup>220</sup> Notably, Mr. Rubin also testified that he "was under incredible schedule pressure..."<sup>221</sup> Google recognized that it faced a critical window of opportunity.
121. An October 2008 Frost & Sullivan Market Insight report highlighted the importance of Google's entrance into the mobile industry, stating:<sup>222</sup>

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<sup>208</sup> Plaintiff's Deposition Exhibit 5063 – GOOG-00100518-523 at 519.

<sup>209</sup> Deposition of Jonathan Gold, December 11, 2015, p. 17.

<sup>210</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 149 - 151.

<sup>211</sup> See Deposition of Urs Hoelzle, November 24, 2015, pp. 300-301.

<sup>212</sup> GOOG 00580439-534 at 463.

<sup>213</sup> GOOGLE-26-00025077; [www.businessinsider.com/how-android-was-created-2015-3](http://www.businessinsider.com/how-android-was-created-2015-3).

<sup>214</sup> GOOGLE-26-00025071.

<sup>215</sup> GOOGLE-58-00048925.

<sup>216</sup> Apple Engineer Recalls the iPhone's Birth, *Wall Street Journal*, March 25, 2014.

<sup>217</sup> Eric Schmidt Trial Testimony, April 24, 2013 at 1458.

<sup>218</sup> Deposition of Urs Holze, November 24, 2015, pp. 56 – 57.

<sup>219</sup> GOOGLE-01-00024675-716 at 711-12; GOOGLE-26-00005904-912 at 906, 911; GOOGLE-26-00006666 – 690; GOOG-00577366-445.

<sup>220</sup> GOOGLE-26-00006162 – 6169, at 6163; GOOGLE-26-00006275 – 299 at 283-289.

<sup>221</sup> Deposition of Andrew Rubin, July 27, 2011, p. 179.

<sup>222</sup> Google 'Opens' a New Front in the Mobile Platform Wars, *Frost & Sullivan Market Insight*, October 23, 2008.



*“Google management has declared that mobile is critically important to the future of the company. Again, the numbers explain why: Google monetizes search on approximately 200 million desktop PCs and Macs. Since there are close to two billion phones sold each year, Google has an opportunity to monetize search in a market that is 10 times greater than their current market. They will continue to promote their cross platform resources such as mobile search and maps. But, Google contends that Android is important to lead the charge in providing a truly open mobile Internet experience that approximates the desktop Internet experience.”<sup>223</sup>*

A Google internal document from 2008 agreed: “Mobile search is *the* key market; it is the primary reason for other companies to partner with us, and it has already been demonstrated to be highly profitable in advanced markets”<sup>224</sup>

122. In August of 2010, Mr. Schmidt commented that Google was increasing traction in its mobile business, stating that display ads were fast proving themselves to be Google’s next \$10 billion opportunity.<sup>225</sup> Mr. Schmidt further commented on the success of Google’s mobile business as follows:

*“The opportunity in mobile is so large it’s breathtaking – our mobile business more than doubled in the last year. The mobile phone is the defining, iconic product in our space.” ... “You start calculating what that will be in a year ... and it looks to me as though Android is well past escape velocity at every level.”<sup>226</sup>*

Escape velocity was apparently no guarantee of success, however. Later that year, speaking to a “Mobile Summit” of Google personnel, then-President of Mobile and Platforms Henrique de Castro declared, “If we miss the ‘mobile window’, we’ll be out of business in 10 years.”<sup>227</sup>

123. As seen in the following **Figure 18** taken from an Operating Committee Quarterly Review dated July 12, 2010, Google implemented a four-phase strategy for Android. Each of the four general phases was broken down into several, more specific, strategic objectives. Notably, the first strategic objective of the first phase of the overall strategy explicitly mentions the use of a “Leading Software Platform” (e.g. Java) to build an “Ecosystem.” Moreover, in addition to relying on Java in connection with accomplishing the first phase of its strategy, as discussed in the sections that follow, I note that Google’s marketplace actions have consistently supported the implementation of the overall strategy reflected below.

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<sup>223</sup> Google ‘Opens’ a New Front in the Mobile Platform Wars, *Frost & Sullivan Market Insight*, October 23, 2008.

<sup>224</sup> GOOG-00360213 – 259 at 244.

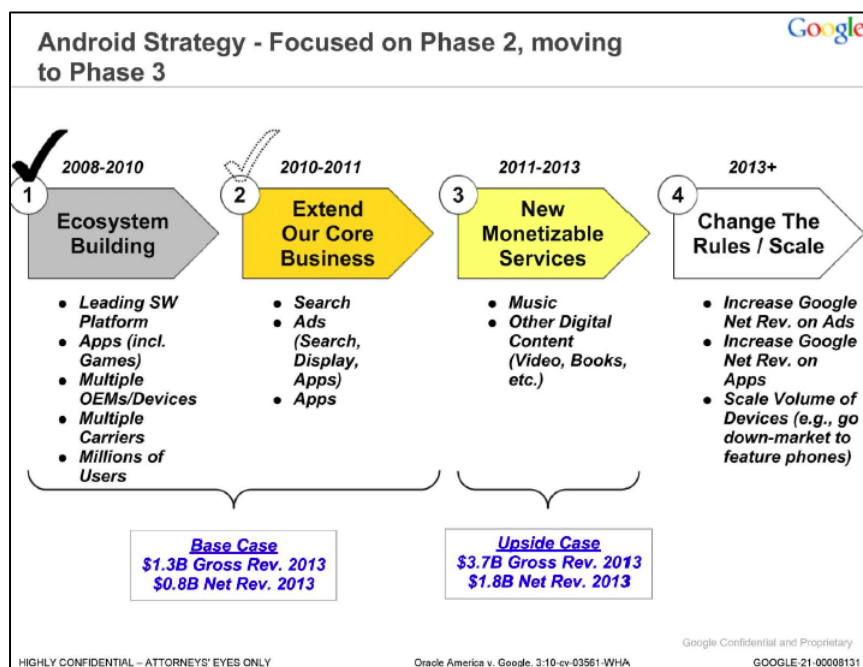
<sup>225</sup> GOOGLE-26-00025769 – 772 at 769-770.

<sup>226</sup> GOOGLE-26-00025769 -772 at 770.

<sup>227</sup> GOOGLE-23-00000049 – 057 at 049.



Figure 18  
Overview of Google's Mobile Strategy<sup>228</sup>



## 8.1 Google Uses Java to Develop the Android Platform

124. The first part of Google's mobile strategy was to develop the Android platform.

### 8.1.1 Google's Acquisition of Android Inc.

125. The Android platform addressed, in part, Google's concern with attracting mobile Internet traffic to its websites and not getting "locked out" of the market for mobile Internet search and advertising.<sup>229</sup> In October 2005, Mr. Rubin reported that "Android exists to make sure folks can't block access to Google; it ensures that users have equal access to services from their phone."<sup>230</sup> A June 2009 Android strategy-related record echoed this theme. According to a Google business record, Android's "strategic value" was tied to ensuring Google was not locked out of the mobile market for Internet browsing.<sup>231</sup> According to a Google business record, Google's ultimate goal for Android was to use it to "make the world's information accessible and

<sup>228</sup> Trial Exhibit 1061 – GOOGLE-21-00008116-139 at 131.

<sup>229</sup> Trial Exhibit 0363 – GOOGLE-22-00060006-044 at 016; Deposition of Brian Swetland, July 7, 2011, p. 54; Deposition of Urs Holze, November 24, 2015, p. 296.

<sup>230</sup> Email exchange regarding Mobile Strategy 2006 – Meeting Notes, October 24, 2015, GOOGLE-01-00056184 – 187 at 187.

<sup>231</sup> Android Strategy and Partnerships Overview, June 2009, GOOGLE-22-00171914 – 951 at 923.



useful on 3.1 billion mobile phones.”<sup>232</sup> Mr. Page acknowledged in his deposition that Android “was very important to the success of Google as a whole,”<sup>233</sup> which was consistent with the view of CEO Eric Schmidt that Android’s success with consumers would “overcome our shortcomings.”<sup>234</sup>

126. As noted, Google faced a critical window. The Android Stock Purchase Agreement was executed in June 2005, and by that year:

- The U.S. wireless penetration rate was already 70.0 percent.<sup>235</sup> And the U.S. penetration rate was well below that of other countries such as Hong Kong (106 percent), The United Kingdom (113 percent), Italy (123 percent), Spain (108 percent), and Finland (101 percent).
- Carriers were deploying networks based on CDMA2000 1xEV-DO and WCDMA/HSDPA technologies that provided mobile Internet access at speeds comparable to what many users got from fixed broadband connections such as DSL.<sup>236</sup> For example, in early 2005, Verizon Wireless introduced 3G handsets that could access Verizon’s EV-DO network and launched VCAST, the first wireless multimedia service in the U.S. to be provided over the next-generation network using EV-DO technology.<sup>237</sup>
- High-speed Internet-access connections using mobile wireless technology increased to 21.9 million connections as of December 31, 2006.<sup>238</sup>
- Sun counted more than 4.5 million Java developers, 2.5 billion Java-enabled devices, and 1 billion Java technology-enabled smart cards. The market research firm Ovum estimates that 708 million Java-enabled handsets were circulating by June 2005.<sup>239</sup>
- Mobile data usage reached approximately 50 percent of U.S. mobile subscribers in the

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<sup>232</sup> Focus Area Narrative: Special Projects – Android, Q1 2008, GOOGLE-01-00048156 – 163 at 156.

<sup>233</sup> Deposition of Larry Page, August 24, 2011, p. 83.

<sup>234</sup> GOOGLE-26-00031558 – 559.

<sup>235</sup> FCC 06-142, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eleventh Report, September 29, 2006, p. 107.

<sup>236</sup> FCC 06-142, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eleventh Report, September 29, 2006, p. 93.

<sup>237</sup> FCC 05-173, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Tenth Report, September 30, 2005, pp. 53 – 54.

<sup>238</sup> FCC 08-28, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Twelfth Report, February 4, 2008, p. 96.

<sup>239</sup> Java Timeline, 1995 – 2015, available at <http://oracle.com.edgesuite.net/timeline/java>.



fourth quarter of 2005, up from 43 percent in the first quarter of 2005.<sup>240</sup> According to Telephia, 22 percent of these mobile subscribers paid to access the web via their wireless device.<sup>241</sup>

- BMI estimated that U.S. retail sales of mobile phone ringtones grew to \$500 million in calendar year 2005, up from \$245 million in 2004 and \$68 million in 2003.<sup>242</sup>

127. An April 2005 Google presentation recommended that Google “acquire Android with an aggressive milestone earn-out component”<sup>243</sup> in an attempt to get a product to market as quickly as possible. On June 30, 2005, Google and Android entered in to a Stock Purchase Agreement (“the Android Stock Purchase Agreement”) whereby Google acquired all of Android, Inc.’s stock for a Closing Purchase Price of \$11 million.<sup>244</sup> The agreement provided for milestone payments of \$8 million, \$10 million, \$15 million, and \$27 million, each to be paid upon achieving specified milestones relating to the unit sales of devices that utilize the Android platform.<sup>245</sup> These milestone payments thus provided Android Inc. principals with substantial incentives to bring a commercially acceptable mobile operating system to market quickly.

### 8.1.2 Google Negotiates with Sun

128. Soon after its acquisition of Android Inc., Google began discussing the possibility of taking a Java license from Sun.<sup>246</sup> Google discussed the possibility of licensing Sun’s technology as early as July 28, 2005, with Google describing its intent to create an internally developed Java Virtual Machine for use in its handset operating system (Project Armstrong). “As part of its wireless strategy, Google wishes to release the entire project, including the JVM, as Open Source to promote adoption of Google services on handsets by carriers and OEMs.”<sup>247</sup>

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<sup>240</sup> FCC 06-142, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eleventh Report, September 29, 2006, p. 72.

<sup>241</sup> FCC 06-142, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eleventh Report, September 29, 2006, p. 72.

<sup>242</sup> FCC 06-142, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Eleventh Report, September 29, 2006, pp. 75 - 76.

<sup>243</sup> Android, EMG M&A Review, April 18, 2005, GOOGLE-58-00048925 – 931 at 926.

<sup>244</sup> Stock Purchase Agreement by and Among Google, Inc. and Android, Inc., June 30, 2005, GOOGLE-00303922 – 4003 at 928 – 929.

<sup>245</sup> Stock Purchase Agreement by and Among Google, Inc. and Android, Inc., June 30, 2005, GOOGLE-00303922 – 4003 at 3930 and 4000.

<sup>246</sup> CLDC licensing discussions with Sun, July 28, 2005, GOOGLE-12-00000473 – 476 at 474.

<sup>247</sup> CLDC licensing discussions with Sun, July 28, 2005, GOOGLE-12-00000473 – GOOGLE-12-00000476 at GOOGLE-12-00000473. I note that the strategy outlined by Google included the following: 1) Google would like to work with Sun to conceive of and agree to a license that enables Google to release to the Open Source Community its internally developed CLDC based JVM. Google wished to achieve this goal with Sun’s blessing and cooperation. 2) Google does not foresee the necessity to license or redistribute any software from Sun; 3) Google desires to be able to call the resulting work Java; 4) Google needs a TCK license; 5) Google proposed that the





129. These licensing discussions continued into 2006, until ultimately Google and Sun were unable to reach an agreement.<sup>248</sup> According to Mr. Rubin, there were two main issues that kept Google and Sun from reaching an agreement – control of the ecosystem and control of the security model.<sup>249</sup> Mr. Rubin testified that “[t]hird-party developers contribute to the success of a platform by having their companies invest in the platform by basing their businesses on the platform. It was [Google’s] intention to create an independent third-party developer ecosystem, and one of the terms [Google and Sun] couldn’t agree on was Sun’s desire to own the third-party developer ecosystem.”<sup>250</sup> Google also wanted the security model to be uncontrolled, similar to the ecosystem, which Google believed was a key principle of an open platform, but Sun also wanted to control the security mechanism of the platform.<sup>251</sup>

### 8.1.3 Android’s Use of the Copyrighted Works.

130. Its inability to obtain a license from Sun did not deter Google from using the 37 Java APIs copied from the Java Platform. As described in the Reports of Messrs. Zeidman, Kemerer and Schmidt, the 37 Java APIs were incorporated into the Android Platform. Much like the API packages in the Java platform, I understand the API packages in the Android platform are used by developers to facilitate the development of programs and apps that run on the Android platform.

#### *Google Open-Sources Android*

131. Android was developed through the Open Handset Alliance, a group of more than 30 technology and mobile companies.<sup>252</sup> Google’s decision to open-source the Android platform was another way in which Google reduced the time it took to get Android to market. Google first publicly disclosed the development of the Android platform in 2007. At that time, Google described Android as “an open-source and free mobile software platform which allows developers to create applications for mobile devices.”<sup>253</sup> Open source meant Google could not be locked out of the platform.
132. Early on, Google recognized the importance of attracting independent software developers to the Android platform. Google needed software developers to create Apps for the Android

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Android product would pass the TCK on reference design before release to open source community, and that OEM licensees would pass TCK again on shipping product 6) OEM pays standard Java royalty to be negotiated by OEM and Sun.

<sup>248</sup> Email from Jonathan Schwartz to Eric Schmidt, Scott McNealy and Sergey Brin Regarding Java/Linux Mobile Platform, April 27, 2006, GOOGLE-66-00000274; Deposition of Andy Rubin, April 5, 2011, p. 28.

<sup>249</sup> Deposition of Andy Rubin, April 5, 2011, pp. 24-26.

<sup>250</sup> Deposition of Andy Rubin, April 5, 2011, pp. 24-25.

<sup>251</sup> Deposition of Andy Rubin, April 5, 2011, pp. 24-25.

<sup>252</sup> Google, Inc. SEC Form 10-K for the year ended December 31, 2007, p. 6.

<sup>253</sup> Google, Inc. SEC Form 10-K for the year ended December 31, 2007, p. 6.





Market, another critical part of Google's Android strategy.<sup>254</sup> In order for Android Market to compete with the iPhone App Store, Google needed a large number of Apps to be available through Android Market/Google Play. Google incentivized independent software developers by matching the revenue sharing terms provided by Apple. (i.e., 70 percent of revenue to developers).<sup>255</sup> By 2005, Google estimated there were more than 4.5 million Java developers. According to Mr. Rubin:

*So I think pretty consistently throughout the development of Android we referred – we really wanted to enable the third-party developer ecosystem in a way where the developers were using tools that they were familiar with. I didn't want to go invent some new thing that developers had to go to school to learn how to program; right, and as I mentioned earlier, a lot of college course work teach the Java programming language. So Java as the programming language is really, really important to our solution because developers can just jump on it without learning something new and, in fact, going back to college. So I think that given the importance of ecosystems in the era of smart phones and app stores and everything else, that the Java programming language was really, really important to us.<sup>256</sup>*

133. In a strategy memo dated October 2007, Mr. Eric Schmidt, Chairman of Google's Executive Board, describes the two parts to Google's mobile strategy, one of which is Android, saying the strategy is to "change the nature of the entire industry with Android. Through deep partnerships with carriers, ODMs, and developers we hope to enable an open ecosystem for the mobile world and create a standard, open software platform for Java-based mobile software."<sup>257</sup>
134. Initially, in 2009, Android appeared on only one phone and one carrier—HTC and T-Mobile and Google was in need of a strong network of carrier and OEM partners. Google used revenue sharing as one means of achieving its goal. Google shared with carriers and handset makers both application revenue and advertising revenue.

### ***The Android Platform is Released to the Market***

135. The development of Android was announced in November 2007 by the Open Handset Alliance – an alliance of handset makers, wireless providers and other technology companies led by Google, T-Mobile, High Tech Computer Corporation, Qualcomm, and Motorola – which was formed to accelerate innovation and "openness" in the provision of mobile wireless services.<sup>258</sup>

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<sup>254</sup> Android Market Setup for Partner Rev-Share, PSO Android Team, GOOGLE-00302808 – 811.

<sup>255</sup> Android Market Setup for Partner Rev-Share, PSO Android Team, GOOGLE-00302808 – 811.

<sup>256</sup> Deposition of Mr. Andy Rubin, July 27, 2011, pp. 122 – 123.

<sup>257</sup> Email regarding Eric 2008 Strategy Memo, October 3, 2007, GOOGLE-26-00006035 – 042 at 038.

<sup>258</sup> FCC DA 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 83.



136. The first Android phone, the T-Mobile G1, was released on October 22, 2008.<sup>259</sup> By 2008 the wireless industry had progressed significantly from where it was in 2005. For example, by 2008:
- U.S. mobile phone users were spending an average of four hours and 38 minutes per month browsing the mobile web in the United States.<sup>260</sup> As of May 2008, M:Metrics estimated that mobile browsing had increased 89 percent year over year among smartphone users in the U.S., and that page views had increased 27 percent.<sup>261</sup>
  - ComScore, Inc.<sup>262</sup> estimated that 28.4 percent of U.S. mobile subscribers had 3G devices in mid-2008.<sup>263</sup> This compares with an average of 28.3 percent of mobile subscribers in the five largest West European countries (Germany, Spain, France, Italy and the United Kingdom).<sup>264</sup>
  - U.S. led among 16 countries in mobile Internet penetration with 15.6 percent of wireless subscribers, followed by, among others, the United Kingdom, (12.9 percent), Italy (11.9 percent), Spain (10.8 percent), France (9.6 percent), and Germany (7.4 percent).<sup>265</sup>
  - As **Exhibit 10** indicates, as of the year ending December 2008, an estimated total of 318.1 million smartphones had been sold worldwide.
  - Apple had already introduced the iPhone (in January 2007). In July 2008, Apple introduced the 3G iPhone that ran on AT&T's WCDMA/HSDPA network.<sup>266</sup>

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<sup>259</sup> T-Mobile Unveils the T-Mobile G1 – the First Phone Powered by Android, <http://www.t-mobile.com/news/t-mobile-unveils-the-t-mobile-g1-the-first-phone-powered-by-android.htm>.

<sup>260</sup> FCC DA 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 100. The estimate is based on on-device metering of actual user behavior of those with Windows, Symbian and Palm handsets in March 2008.

<sup>261</sup> FCC DA 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, pp. 100 – 101.

<sup>262</sup> comScore, Inc. is a global media measurement and analytics company that makes audiences and advertising more valuable across all screens that matter. According to comScore, it helps media buyers and sellers understand and make decisions based on how consumers use different media, such as TV, video, mobile, desktop and more. <http://ir.comscore.com/releasedetail.cfm?ReleaseID=944439>

<sup>263</sup> FCC DA 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 107.

<sup>264</sup> FCC DA 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 107.

<sup>265</sup> FCC DA 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 107.

<sup>266</sup> FCC DA 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 9.



- At the same time, Apple opened the App Store.<sup>267</sup> According to Apple, there were about 900 applications available on the App Store as of August 2008, and 20 percent of these could be downloaded free of charge.<sup>268</sup>
- 137. As stated previously and shown in **Figure 17**, as of January 2008, nearly 85 percent of iPhone users accessed news and information via a browser, as compared to about 58.2 percent of other smartphone users and compared to the market average of 13.1 percent.
- 138. Despite being late to the mobile wireless market, in an email to Google employees in November 2008, Google stated that Android was one of the core areas at the heart of Google's strategy and had the "potential to be a 'game changing' event for the mobile industry and Google."<sup>269</sup>
- 139. Mobile industry participants such as OEMs and wireless carriers appreciated the potential "game changing" nature of the Android platform. According to the FCC, as of 2008, "three of the four nationwide providers [had] expressed interest in offering mobile handsets that use an operating system called Android, which [was] being designed to facilitate access to third-party content providers."<sup>270</sup>
- 140. According to the FCC, Google's business model differed fundamentally from that of rivals such as Apple and other industry players. The FCC reported in January 2009 that analysts "stress that Google will lose money on Android as an operating system, since . . . Google is giving the Android software away free to wireless service providers and handset makers." According to the FCC, as of January 2009, Google "hope[d] to earn revenue from advertising, just as it now does on the PC-based Internet . . . the mobile search advertising market is a promising source of ad revenue."<sup>271</sup>
- 141. During Google's Q3 2010 Earnings Call, Mr. Schmidt described Android as "probably the largest single platform play available in the market today, because it's a platform for computation for location, for everything that you could do with the new and most popular set of computing devices that are emerging. That market is larger than the PC market, and the Tablet market is a small component of it, but an important part of it. So if you think as Mobile as platform as

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<sup>267</sup> FCC DA 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 9.

<sup>268</sup> Apple keeps 30 percent of the proceeds from sales of iPhone applications for which customers pay to download, while developers receive the remaining 70 percent (see, FCC DA 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 82).

<sup>269</sup> Email regarding [Googlers] Highlights from the 2009 Planning Process, November 19, 2008, GOOGLE-17-00738457 – 460 at 457 – 458.

<sup>270</sup> FCC DA 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 82.

<sup>271</sup> FCC DA 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, pp. 85 - 86.



phone plus Tablet plus all the other things, we hope to become the leading platform in that space, and we are doing it with open source approach.”<sup>272</sup>

142. In 2010, reflecting upon Google offering the Android platform for free, Google noted that achieving a “\$1 billion run rate in Mobile, is testament to the fact that, now we have a revenue model . . . and that revenue model sort of proves to us that, roughly the revenues are split between our search efforts, our display efforts and our application efforts. We are able to play across all those three spaces with our mobile monetization efforts, and the more people who use smartphones, the more people who are able to access (throughout) on their devices, the more we see the trend that people are going to search in them, they’re going to give us opportunities to put display advertising on them. So, we see no reason to change our monetization model. We think the current approach to Android drives more users and more [] usage and drives the Ecosystem.”<sup>273</sup>
143. By 2011, Google had entered Phase 3 of its 4-Phase plan, and was “on track to be on a \$1B (that’s \$1,000,000,000 or one thousand million dollars) run rate by end of 2011. But we’re just getting started.”<sup>274</sup>
144. As of May 2015, Google reported there were over 400 manufacturers and more than 500 carriers selling Android devices.<sup>275</sup> Also, as of October 2015, there are 1.4 billion users of Android devices.<sup>276</sup> **Figure 19** below is a Google summary of the evolution of the Android platform from its initial sale in October 2008 to October 2011.

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<sup>272</sup> Google Inc. Q3 2010 Earnings Call Transcript,  
<http://www.morningstar.com/earnings/printtranscript.aspx?id=18282869>.

<sup>273</sup> Google Inc. Q3 2010 Earnings Call Transcript,  
<http://www.morningstar.com/earnings/printtranscript.aspx?id=18282869>.

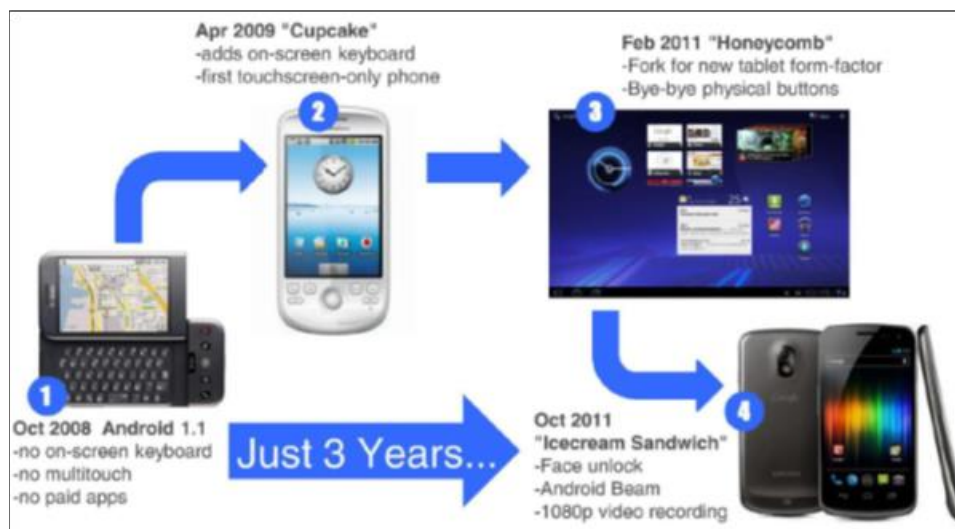
<sup>274</sup> GOOG-00273854 – 874 at 873.

<sup>275</sup> You say you want a mobile revolution..., Google Blog, May 28, 2015,  
<https://googleblog.blogspot.com/2015/05/io-2015-mobile-revolution.html>.

<sup>276</sup> Alphabet (GOOG) Q3 2015 Results – Earnings Call Transcript, October 22, 2015,  
<http://seekingalpha.com/article/3596706-alphabet-goog-q3-2015-results-earnings-call-transcript>.



Figure 19

Evolution of the Android Platform<sup>277</sup>

## 8.1.4 Google Introduces the Nexus Line of Smartphones

145. In January 2010, Google began selling its own version of an Android-based smartphone, the Nexus One, directly to consumers.<sup>278</sup> During a keynote speech at the 2010 Mobile World Congress, Mr. Schmidt discussed the idea of “Mobile First,” stating: “We understand that the new rule is mobile first...Mobile first in everything. Mobile first in terms of applications...And it means...that we have a role now to inform, to educate through all these devices.’ Google programmers now want to do work on mobile first, before the desktop.”<sup>279</sup>

## 8.1.5 Google Develops the Android Market (Now Known as “Google Play”)

146. From Google’s perspective, the Android platform was designed to support several different objectives. First, Android supported and brought together in one package a number of applications Google developed for mobile handsets, including the Google Search service, Google maps, and an advanced mobile Web browser intended to rival the browser on the Apple iPhone.
147. Second, Android provided a platform to support a marketplace for Apps made by other companies. Like Apple’s software development kit and App store, Android was designed to make it easier for third-party software developers to make their Apps available on mobile

<sup>277</sup> GOOG-00275390 – 410 at 406.

<sup>278</sup> FCC 10-81, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services, Fourteenth Report, May 20, 2010, p. 83.

<sup>279</sup> Google’s New Rule: Mobile First, February 16, 2010, <http://www.pcmag.com/article2/0,2817,2359752,00.asp>.



handsets and to integrate these Apps with handset features such as location-sensing technology.<sup>280</sup> The Android Market provided the following benefits to Google:<sup>281</sup>

- It ensured an open App ecosystem without the traditional barriers to entry or distribution, maximizing the return on investment for developers;
- It was a carrot for handset manufacturers to be Android-compatible, and
- It helped ensure Google got their Apps out to mobile users.<sup>282</sup>

148. In order to help increase the number of Apps available through the Android Market, Google introduced an Android Developer Challenge that provided \$10 million in rewards.<sup>283</sup> This investment accomplished the goal of adding more apps to the Android Market, which can be seen in a slight decrease in the number of Apps after the Developer Challenge was discontinued, as reflected in **Figure 20**.<sup>284</sup>

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<sup>280</sup> FCC DA 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, pp. 83 - 84.

<sup>281</sup> Android Market Setup for Partner Rev-Share, PSO Android Team, GOOGLE-00302808 – 811.

<sup>282</sup> Android Market Setup for Partner Rev-Share, PSO Android Team, GOOGLE-00302808 – 811.

<sup>283</sup> Android Strategy and Partnerships Overview, June 2009, GOOGLE-22-00171914 – 951 at 949.

<sup>284</sup> Android OC Quarterly Review – Q3/Q4, GOOGLE-00303867 – 884 at 874.



**Figure 20**  
**Published Apps in Android Market**



149. As of December 2009, the “Android Market had 15,000 [available Apps].” Google reported 40 million downloads in 14 months (November 2008 through December 2009), as compared to Apple App Store’s 100,000 applications and over 2 billion downloads in 17 months.<sup>285</sup>
150. According to the FCC, “Android is made available free of charge to handset manufacturers and wireless service providers, and is available on multiple devices and multiple service providers. Android is also an open source platform; the launch of applications and content by third-party developers through the Android Market application store requires no approval by either Google or the wireless service provider.”<sup>286</sup>

## 8.2 Google Establishes Distribution Partnerships

151. As noted above, in the early 2000s Google was concerned as search activity was migrating to mobile devices and the companies who controlled those devices had the power to exclude Google’s services.<sup>287</sup>

<sup>285</sup> FCC 10-81, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services, Fourteenth Report, May 20, 2010, p. 83.

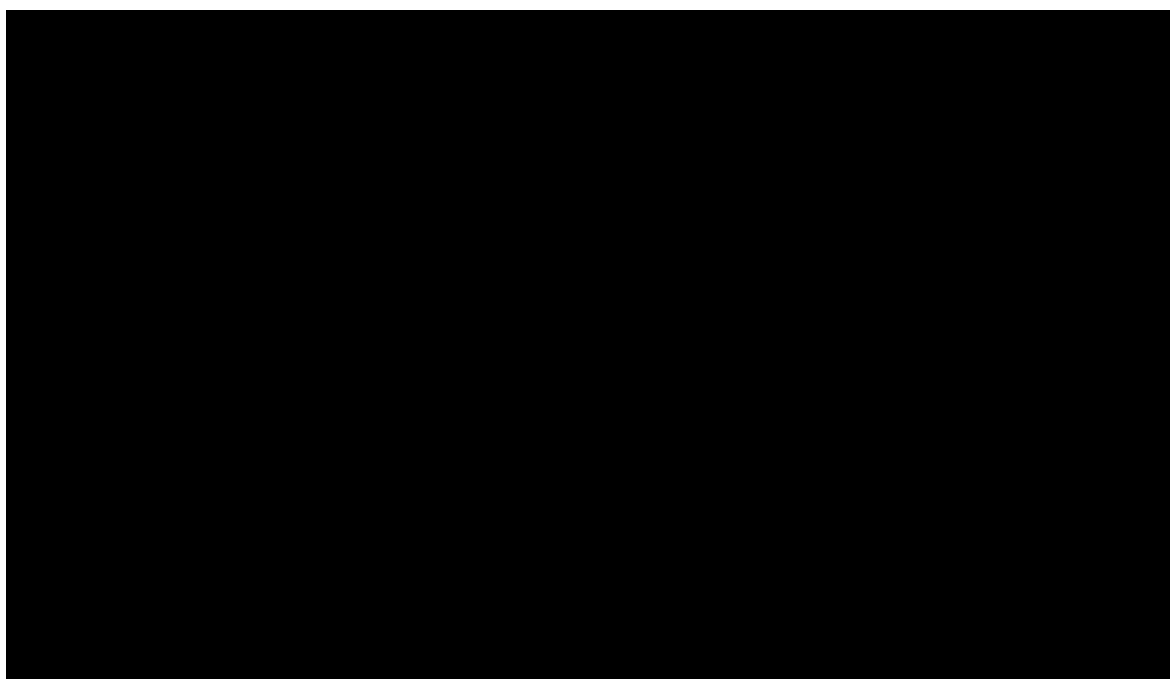
<sup>286</sup> FCC 10-81, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services, Fourteenth Report, May 20, 2010, p. 83.

<sup>287</sup> GOOGLE-01-00056184 – 187; Google, Inc. SEC Form 10-K for the year ended December 31, 2004, pp. 57-58; Google, Inc. SEC Form 10-K for the year ended December 31 2005, p. 32.





152. To address this concern, Google entered into various agreements with wireless carriers and OEMs within the U.S. and abroad. For example, in 2009, the FCC reported: *“that Sprint Nextel recently entered into a deal with Google under which Sprint Nextel added Google as the default Web search bar on browsers in more than 40 of its handsets, and as part of that deal Sprint Nextel shares revenue from ads Google displays in response to searches.”*<sup>288</sup>
153. By 2013, Google had entered into at least fifty different agreements whereby Google shared Search/Ad Revenue and/or Google Play revenue with wireless carriers and OEMs located in the United States, Japan, Korea, and Google’s Europe-Middle-East-Africa regions.<sup>289</sup> **Figure 21** below reflects the names of Google’s wireless carrier Distribution Partners and the total amounts Google paid to each of them in 2013 and 2014.

**Figure 21**<sup>290</sup>**Google Payments to Wireless Carrier Distribution Partners**

- [Redacted]

<sup>288</sup> FCC DA 09-54, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Thirteenth Report, January 16, 2009, p. 65; GOOGLE-22-00113654.

<sup>289</sup> GOOG-00130338-386 at 362; Plaintiff’s Deposition Exhibit 5091.

<sup>290</sup> GOOG-00130338-386 at 362; Plaintiff’s Deposition Exhibit 5091.



154.

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<sup>291</sup> GOOGLE-03169550-603 at 576. The term of the agreement ended on December 31, 2011. GOOGLE-03169550-603 at 550.

<sup>292</sup> GOOG-00130338-386 at 362; GOOGLE-03169604-616 at 604; GOOGLE-01-00131959-962

<sup>293</sup> GOOG-10000176-203 at 176.

<sup>294</sup> GOOG-10000164-168; GOOG-10000153-163 at 153.

<sup>295</sup> GOOG-10000176-203 at 186 and 196; GOOG-10000153, GOOG-10000164, GOOG-10000169

<sup>296</sup> GOOGLE-22-00071003-051 at 003.

<sup>297</sup> GOOGLE-22-00071003-051 at 038; GOOGLE-00-00000268-288 at 280; GOOGLE-22-00520449-462 at 454.

<sup>298</sup> GOOGLE-30-00036599-611.

<sup>299</sup> Deposition of Rachel Claflin dated April 26, 2011, pp. 80-81.

<sup>300</sup> See GOOGLE-00393489-610.

[illegible]

155. As Google prepared to launch Android, it needed to build its ecosystem. This required it to enter into a deal with a wireless carrier, and an OEM that would manufacture the first Android device. [REDACTED]

[illegible]

156.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] [REDACTED]

[REDACTED]

[REDACTED] [REDACTED] [REDACTED]

[REDACTED]

[REDACTED] [REDACTED]

[REDACTED]

<sup>301</sup> GOOGLE-00393489-610 at 491, 492, 496.

<sup>302</sup> GOOGLE-00393489-610 at 496.

303 GOOGLE-00393414-445 at 416.

<sup>304</sup> GOOGLE-00-00000289-348 at 289.

<sup>305</sup> GOOGLE-00-00000289-348 at 325.

<sup>306</sup> GOOGLE-00396160-177 at 160 and 164.

<sup>307</sup> GOOGLE-00396160-177 at 175.

<sup>308</sup> GOOGLE-00396160-177 at 176.

309 GOOGLE-00396178-206.

<sup>310</sup> GOOGLE-00396178-206 at 180-181.



157. T-Mobile was only the fourth most popular wireless carrier in the United States.<sup>311</sup> In order to continue the expansion of its ecosystem, Google had to secure an agreement with a more popular wireless carrier. AT&T had the greatest number of subscribers at that time period and an exclusive contract with Apple to sell the iPhone.<sup>312</sup> That left Google to woo Verizon, the wireless carrier with the second largest subscriber base.<sup>313</sup> [REDACTED]

158. [REDACTED]

159. This method of distribution shows that Google and its business partners believe there was a connection between the Android platform and the advertising revenue. I understand Google has continued to enter into other revenue-sharing agreements with carriers and OEMs.

### 8.3 Current and Anticipated Android Devices and Uses

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#### 8.3.1 Android Mobile Phones

160. The Android platform was developed to operate mobile devices such as mobile phones and tablets. As reflected in **Exhibit 9**, according to Gartner, since the first Android handheld device was offered for sale in 2009, 3.6 Billion Android smartphones have been sold worldwide by

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<sup>311</sup> Will Park, *Top Ten US Wireless Carriers*, IntoMobile, <http://www.intomobile.com/2008/08/20/top-ten-us-wireless-carriers/> (Aug. 20, 2008).

<sup>312</sup> Will Park, *Top Ten US Wireless Carriers*, IntoMobile, <http://www.intomobile.com/2008/08/20/top-ten-us-wireless-carriers/> (Aug. 20, 2008); <http://www.engadget.com/2010/05/10/confirmed-apple-and-atandt-signed-five-year-iphone-exclusivity-de/>.

<sup>313</sup> Will Park, *Top Ten US Wireless Carriers*, IntoMobile, <http://www.intomobile.com/2008/08/20/top-ten-us-wireless-carriers/> (Aug. 20, 2008).

<sup>314</sup> GOOGLE-03169550-603.

<sup>315</sup> GOOGLE-03169550-603 at 576. The term of the agreement ended on December 31, 2011. GOOGLE-03169550-603 at 550.

<sup>316</sup> GOOGLE-03169550-603 at 561.

<sup>317</sup> GOOGLE-03169604-616 at 605 and 611.

<sup>318</sup> GOOGLE-03169604-616 at 609.



various manufacturers such as HTC, Samsung, LG and others. Thus, Google had met milestone one and phase one of its 4-phase mobile strategy.

161. In January 2010, Google introduced the Nexus One mobile phone manufactured by HTC.<sup>319</sup> In an attempt to change the way consumers purchase smartphones, Google sold the phone online with no carrier or manufacturer customizations. In December 2010, Google released the Nexus S manufactured by Samsung with a larger 4 inch screen and more storage.<sup>320</sup> Samsung stated it sold 512,000 Nexus S phones from Q2-2011 to Q2-2012.<sup>321</sup> Since the Nexus S, Google has released the following Nexus smartphones:
- Galaxy Nexus (Samsung) – October 2011
  - Nexus 4 (LG) – October 2012
  - Nexus 5 (LG) – October 2013<sup>322</sup>
  - Nexus 6 (Motorola) – October 2014<sup>323</sup>
  - Nexus X5 (LG) & 6P (Huawei) – October 2015<sup>324</sup>
162. In September 2014, Google announced the launch of its Android One platform to target the low-end mobile phone market in emerging markets.<sup>325</sup> Thus, at this time Google was focused on executing phase four of its 4-phase mobile strategy. The initial launch included phones available in India, with plans to expand to Indonesia, the Philippines, Bangladesh, Nepal, Pakistan and Sri Lanka shortly thereafter.<sup>326</sup> Google initially offered for sale three mobile phones manufactured by Micromax, Spice and Karbonn, each priced at around \$100.<sup>327</sup> Despite the use of lower cost components, Android One devices run the same version of the Android platform that higher end mobile phones run.<sup>328</sup>
163. By May 2015, Android One was launched in seven countries – India, Bangladesh, Nepal, Sri Lanka, Indonesia, the Philippines, and Turkey – with eleven OEMs and 612,000 devices activated.<sup>329</sup> In a Google 2015 Product Plan presentation, Google noted its plan to get the next billion users was to “bring Google services to emerging countries” with Android One.<sup>330</sup>

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<sup>319</sup> <http://www.androidauthority.com/history-nexus-smartphone-line-536352/>.

<sup>320</sup> <http://www.androidauthority.com/history-nexus-smartphone-line-536352/>.

<sup>321</sup> <http://www.androidauthority.com/history-nexus-smartphone-line-536352/>.

<sup>322</sup> <http://www.androidauthority.com/history-nexus-smartphone-line-536352/>.

<sup>323</sup> <http://www.motorola-blog.blogspot.com/2014/10/nexus-6-from-google-and-motorola-more.html>.

<sup>324</sup> <http://www.gizmag.com/nexus-6p-vs-nexus-5x-comparison/39699/>.

<sup>325</sup> Google’s Android One Platform About More Than Just Phones, *Trefis*, September 17, 2014, p. 1.

<sup>326</sup> Google’s Android One Platform About More Than Just Phones, *Trefis*, September 17, 2014, p. 1.

<sup>327</sup> Google’s Android One Platform About More Than Just Phones, *Trefis*, September 17, 2014, p. 1.

<sup>328</sup> Deposition of Hiroshi Lockheimer, December 8, 2015, pp. 138-139.

<sup>329</sup> Introduction to Android, May 2015, GOOG-00130338 – 386 at 377.

<sup>330</sup> 2015 Product Plan – Google Board of Directors, January 28, 2015, GOOG-00100312 –330 at327.



164. According to Mr. Jonathan Gold, Finance Director at Google, Google does not generate revenue from Android One.<sup>331</sup> However, according to Trefis, the launch of Android One was aimed to combat the pricing pressure on ads and slower growth in search queries that led to a slowdown in Google's revenue growth in 2014 by increasing the number of users on its Android platform, which would potentially increase search queries and sales of Apps in the Google Play store.<sup>332</sup>

### 8.3.2 Android Tablets

165. **Exhibit 9** summarizes annual worldwide Android smartphone and tablet unit sales. As **Exhibit 9** indicates, 489.6 million Android tablets have been sold worldwide since its introduction in 2010.
166. In June 2012, Google introduced its first Nexus tablet, the Nexus 7 manufactured by Asus.<sup>333</sup> In October 2012, just four months after the release of the Nexus 7, Asus announced that it was selling close to one million Nexus 7 tablets a month<sup>334</sup> and UBS estimated that there were approximately 5.4 million Nexus tablets shipped in 2012.<sup>335</sup> Based on estimates provided by UBS as of January 2014, the Nexus 7 tablet has "been the biggest contributor to Nexus-related revenues."<sup>336</sup> Further, according to UBS, Google "disclosed in July 2013 that Nexus 7 tablets comprised 10% of all Android tablet activations up to that point."<sup>337</sup> In December 2015, Google released the Pixel C tablet, the first Android tablet designed and built by Google to be a tablet-laptop hybrid.<sup>338</sup>

### 8.3.3 Android Wearables (Watches)

167. In June 2014, Google announced "Android Wear" with the LG G Watch, Samsung Gear Live smartwatches, and Moto 360. Android Wear seamlessly syncs apps between smartphones and smartwatches and vice versa.<sup>339</sup> Google recently indicated that manufacturers had created seven

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<sup>331</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 210-211.

<sup>332</sup> Google's Android One Platform About More Than Just Phones, *Trefis*, September 17, 2014, p. 2.; GOOG-00276658 – 675.

<sup>333</sup> <https://www.google.com/about/company/history/>;  
<http://www.theguardian.com/technology/2015/sep/29/pixel-c-first-wholly-google-made-tablet>.

<sup>334</sup> <http://www.cnet.com/news/asus-nexus-7-sales-climb-toward-1-million-a-month/>.

<sup>335</sup> Key Call: Google Inc. The Innovation Leader, *UBS*, January 6, 2014, p. 12.

<sup>336</sup> Key Call: Google Inc. The Innovation Leader, *UBS*, January 6, 2014, p. 12.

<sup>337</sup> Key Call: Google Inc. The Innovation Leader, *UBS*, January 6, 2014, p. 12.

<sup>338</sup> <https://googleblog.blogspot.com/2015/12/meet-pixel-c-our-take-on-tablet.html>; <https://pixel.google.com/pixel-c/>.

<sup>339</sup> <http://www.digitaltrends.com/mobile/android-wear-os-news-release-features/>.



different Android Wear watches with more than 1,500 different watch faces. According to J.P. Morgan, developers have created more than 4,000 Apps for Android Wear.<sup>340</sup>

168. According to a transcript of Alphabet's (Google) Q3 2015 earnings call, Android Wear works with both the Android OS and iOS, as well as with Android Auto, the Internet of Things platform Brillo, and Chrome.<sup>341</sup> As of December 2015, watches are the only type of Android Wear that is commercially available to consumers.<sup>342</sup>

#### 8.3.4 Android Television

169. In June 2014, Google announced Android TV, which as "the successor to the ill-fated Google TV, brings a new, streamlined user interface to TVs, game consoles, and set top boxes, designed to put content front and center. Android TV brings music, games, apps, movies, and TV shows alongside Android to your big screen."<sup>343</sup> Android TV manufacturers include Sony, Sharp, and TPVision.<sup>344</sup>
170. According to a June 2015 Jefferies report, Android TV is able to interact with any Android device, including Android Wear products.<sup>345</sup> Google plans to generate revenue from Android TV through revenue sharing arrangements with App developers and content creators, such as HBO, that the user purchases or subscribes to on his Android TV, as well as from ads displayed in Google apps, such as YouTube that are used on Android TV.<sup>346</sup>

#### 8.3.5 Android Auto

171. According to Google's website, "Android Auto automatically brings you useful information, and organizes it into simple cards that appear just when they're needed."<sup>347</sup> With Android Auto, people can use Google Maps, listen to music on Google Play, make voice calls and send and receive messages, and use a variety of Apps. The Hyundai Sonata was the first car to have Android Auto starting in May 2015.<sup>348</sup> As of September 2015, the Honda Civic/Accord and VW

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<sup>340</sup> J.P Morgan Report, Google I/O 2015 Takeaways: Platform & Product Enhancements to Strengthen Google's Mobile Ecosystem, May, 29, 2015, p. 2.

<sup>341</sup> Thomson Reuters Streetevents Edited Transcript GOOGL – Q3 2015 Alphabet Inc Earnings Call, October 22, 2015, p. 6.

<sup>342</sup> Deposition of Hiroshi Lockheimer, dated December 8, 2015, p. 99.

<sup>343</sup> <http://www.androidcentral.com/android-tv-announcement>.

<sup>344</sup> <http://www.businessinsider.com/android-tv-launch-google-io-2014-6>.

<sup>345</sup> Google I/O: Google Focuses on Extending Android to TVs, Cars and Wearables, *Jefferies*, June 26, 2014, p. 1.

<sup>346</sup> Deposition of Hiroshi Lockheimer, December 8, 2015, pp. 72-73, 76.

<sup>347</sup> <https://www.android.com/auto/>.

<sup>348</sup> <http://www.androidcentral.com/some-hyundai-car-buyers-now-have-option-have-android-auto-installed>





Golf offered Android Auto.<sup>349</sup> Android Auto has gained support from the Open Automotive Alliance consisting of 50 car manufacturers ranging from Ford, Honda, Nissan, Maserati, Bentley and many more.<sup>350</sup>

### 8.3.6 ARC Welder Runs Android Apps on Google's Chrome Operating System

172. Google announced the App Runtime for Chrome ("ARC") project at the June 2014 I/O Developer Conference.<sup>351</sup> ARC allows Google to bring Android Apps to the Chrome operating system. This means Google is now using Android to occupy the original, traditional market of the Java Platform. In April 2015, Google released an ARC Welder Chrome app that allows a user to run Android Apps on Chrome OS or using the Chrome web browser.<sup>352</sup> ARC Welder allows developers to more easily test Android Apps.<sup>353</sup>

### 8.3.7 Internet of Things / Brillo

173. In May 2015, Google announced its plan to create a platform like Android ("Brillo") for the Internet of Things ("IOT"), an very popular concept of building a network of physical object or "things" embedded with electronics, software, sensors, and network connectivity, which enables the objects to collect and exchange data. The IOT is "Brillo will allow for anything internet enabled, whether that be light bulbs, cars, TVs, or something else, to intercommunicate. Developers will be able to make simple Android apps that automatically inter-communicate with other Brillo based devices in the home."<sup>354</sup> Mr. Hiroshi Lockheimer, a Google Senior Vice President, stated in his deposition "[t]here are a lot of hardware providers that are familiar with Android, so our idea was to take that broad support base for the Android kernel and drivers and so on and make it possible for folks who are familiar with that technology to also build devices in the IOT space."<sup>355</sup>

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<sup>349</sup> <http://www.androidcentral.com/2016-honda-civic-introduces-support-android-auto>;  
<http://www.androidcentral.com/hondas-first-car-android-auto-will-be-2016-honda-accord>;  
<http://www.androidcentral.com/volkswagen-announces-android-auto-support-its-2016-lineup>;

<sup>350</sup> <http://9to5mac.com/2014/06/25/car-makers-will-offer-android-auto-alongside-carplay-later-this-year/>;  
 Deposition of Hiroshi Lockheimer, December 8, 2015, pp. 100-101, 106.

<sup>351</sup> <http://www.androidauthority.com/google-arc-welder-598170/>.

<sup>352</sup> <http://www.howtogeek.com/214734/how-to-use-googles-arc-welder-to-run-android-apps-in-chrome/>

<sup>353</sup> <http://www.howtogeek.com/214734/how-to-use-googles-arc-welder-to-run-android-apps-in-chrome/>

<sup>354</sup> <http://www.slashgear.com/brillo-is-googles-android-play-for-the-internet-of-things-28385621/>

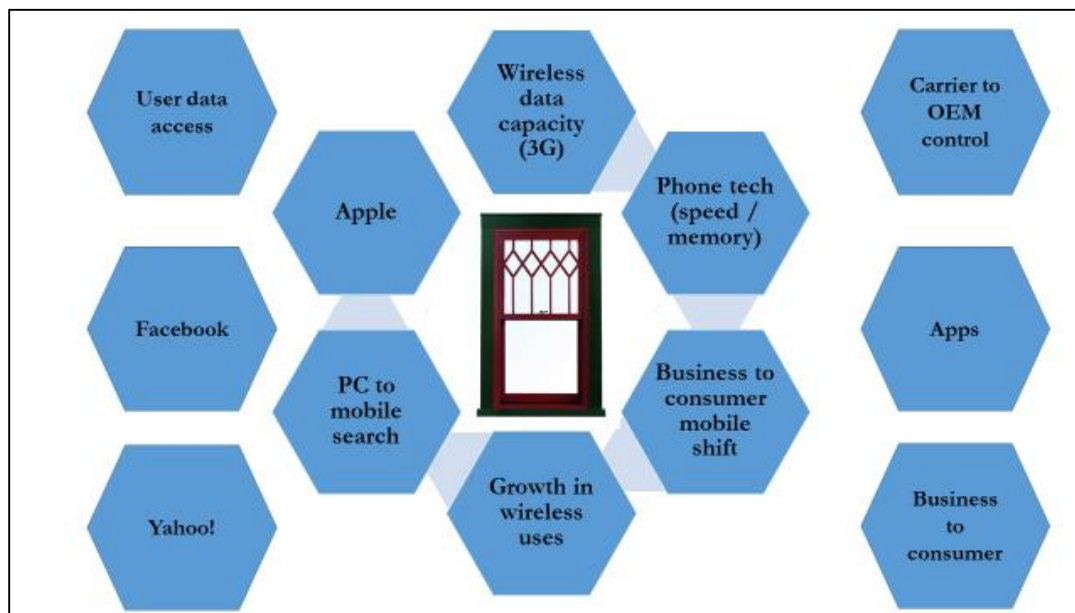
<sup>355</sup> Deposition of Hiroshi Lockheimer, December 8, 2015, p. 69.



#### 8.4 Unique Window of Market Opportunity

174. As shown on **Figure 8**, the decade from 2002 to 2012 saw U.S. wireless penetration grow from under 50 percent to more than 100 percent.<sup>356</sup> As reflected in **Figure 9**, this growth was experienced in many countries around the world.<sup>357</sup> For potential purveyors of mobile operating systems like Sun, Apple and Google, this period represented a unique “Mobile Window” of opportunity. In 2006, Sun realized that it needed to release a smartphone product in a timely manner or “miss [the] market window.”<sup>358</sup> Google viewed the evolution from desktop to mobile search as a threat to its desktop search business as well as an opportunity. In 2010, Google specifically acknowledged the “mobile window” and recognized that the successful uptake of its mobile platform was critical to the survival of its business.<sup>359</sup>
175. **Figure 22** below identifies factors that shaped the mobile industry during the most critical period of the “Mobile Window,” at exactly the time the Android operating system was under development.

**Figure 22**  
**Google Payments to Wireless Carrier Distribution Partners**



<sup>356</sup> CTIA’s Wireless Industry Indices – Annual Wireless Survey Results: A Comprehensive Report from CTIA Analyzing the U.S. Wireless Industry – Year-End 2014 Results, CTIA-The Wireless Association, Sept. 2015, p. 31.

<sup>357</sup> **Figure 9.**

<sup>358</sup> OAGOOGL0004936380 – 436 at 404.

<sup>359</sup> Trial Exhibit 370 – GOOGLE-23-00000049-057 at 049.



176. The transition from lower-functioning feature phones to higher functioning smartphones was driven in large part by the development of wireless technologies with greater bandwidth and also increasing hardware capabilities in mobile devices. For example, with the launch of wireless broadband services based on EV-DO or WCDMA/HSDPA technologies by most nationwide providers and some smaller regional providers, the number of subscribers increased from 3.1 million as of December 31, 2005 to more than 21 million in 2006.<sup>360</sup> Verizon Wireless introduced 4G LTE in 2010,<sup>361</sup> with download speeds four to five times faster than 3G networks, which rivaled some home broadband connections.<sup>362</sup>
177. Early wireless devices, from two-way pagers to early Palm One and Blackberry devices, were designed primarily for business use. However, the development of faster wireless technologies and the introduction by carriers of wireless data plans for individuals drove consumer demand for higher-functioning mobile devices. In response, “Mobile First” became a strategic cry for potential mobile operators and other competing firms within the Internet and mobile industries, including Google.<sup>363</sup>
178. Google was not alone in its recognition of the business opportunity. Google’s business records identify at least the following as competitors and “threats” to its objectives relating to the mobile market.
- **Microsoft:** Google identified Microsoft as a mobile competitor as early as 2005. In a Google Mobile Strategy presentation dated November 2005, Google notes that Microsoft announced that it had recently launched Live Search Mobile, which included mobile search services (Web, Local and Spaces).<sup>364</sup> A 2007 presentation entitled “Google Mobile Strategy to Win” indicates that Google viewed its mobile competition as “Getting More Aggressive.” The presentation reports that Windows Mobile 6 with “Windows Live Search” was recently launched in September 2006.<sup>365</sup> As of Q3 2008, Google viewed Window Mobile Devices with bundled Live Search, Maps and other services to be a “clear threat to our global business.”<sup>366</sup>

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<sup>360</sup> FCC 08-28, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Twelfth Report, February 4, 2008, p. 96.

<sup>361</sup> 4G LTE: Here and Abroad, Verizon News Center, June 27, 2013.

<sup>362</sup> What is 4G LTE and Why it Matters, Verizon News Center, April 30, 2012.

<sup>363</sup> “The Fatal Mistake that Doomed Blackberry,” Time.com, Technology & Media, September 24, 2013; <http://marketingland.com/what-google-mobile-first-rules-mean-for-your-marketing-strategy-126879>.

<sup>364</sup> GOOG-01-00017299 – 350 at 344.

<sup>365</sup> GOOGLE-30-00101210 – 215 at 213.

<sup>366</sup> GOOG-00360213 – 259 at 218.



- **Yahoo!**: According to a 2006 Mobile Strategy Presentation, Google viewed Yahoo! as a competitor. Google noted that Yahoo! Japan had recently launched a new mobile restrictive search, and announced plans to take its mobile ads “out for testing” by spring 2006.<sup>367</sup> Eric Schmidt provided a Strategy Update to the Google Board of Directors in 2006 which explained for “The Business We Are In.” “Microsoft and Yahoo! Are [sic] our primary competitors worldwide.”<sup>368</sup> A 2007 presentation entitled “Google Mobile Strategy to Win” indicates that Google was concerned with Yahoo!’s launch of Y!Go Version 2.0 in February 2007.<sup>369</sup>
- **Nokia**: Finland’s wireless penetration rates grew dramatically during this period and approached nearly 200% as of 2011,<sup>370</sup> providing a strong foundation for Nokia which Google considered a significant threat to become one of two dominant handset suppliers along with Apple. A Google Q3 2008 Mobile Narrative identifies Nokia as a Google competitor, “with 40% handset market share globally.”<sup>371</sup> Google viewed Nokia as a “[s]ignificant potential threat to our Local Search and Mobile Ads business.”<sup>372</sup> According to this presentation, “Nokia Maps is pre-installed on every S60 device (and many S40 devices starting next year); it could completely dwarf GMM’s installed base by a factor of 10 or more.”<sup>373</sup>
- **Apple**: Google also viewed Apple, Inc. as a major competitor in the mobile space, as well as a partner. Google was deeply concerned with its market entry behind Apple. Google was under intense pressure not to let Apple move too far ahead, and the two companies were pacing each other in the smartphone market.<sup>374</sup>

The race to get mobile devices to market is illustrated by the close proximity of the dates of Apple’s and Google’s introduction and launch of their respective mobile devices. Apple introduced the Apple iPhone on January 9, 2007. The iPhone was first offered for sale by AT&T on June 29, 2007. Google tried to keep pace. It introduced Android on November 5, 2007, and the first Android operated device was available for sale in November 2008. The close race between Google and Apple was not lost on the media.

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<sup>367</sup> GOOG-01-00017299 – 350 at 344.

<sup>368</sup> GOOGLE-26-0000005905-912 at 906.

<sup>369</sup> GOOGLE-30-00101210 – 215 at 214.

<sup>370</sup> Figure 9.

<sup>371</sup> GOOG-00360213 – 259 at 217.

<sup>372</sup> GOOG-00360213 – 259 at 217.

<sup>373</sup> GOOG-00360213 – 259 at 217. GMM stands for Google Maps for Mobile.

<sup>374</sup> “The Day Google Had to ‘Start Over’ on Android,” The Atlantic, December 18, 2013, [www.theatlantic.com](http://www.theatlantic.com); GOOGLE-26-00023709-728 at 714.



One article described Google as “gradually creeping out of the shadows to challenge Apple’s dominance of the mobile applications market.”<sup>375</sup>

On August 29, 2006, Google’s then CEO, Mr. Eric Schmidt, was elected to Apple’s Board of Directors which provided unique insight into the business strategies and objectives of Apple, Inc. However, Mr. Schmidt’s position on the board was later investigated by the Department of Justice for possible antitrust violations.<sup>376</sup>

- **Facebook:** Facebook in particular represented a large network of users and a corresponding unique and personal set of user data relevant to Internet search.<sup>377</sup> Had Facebook implemented Internet search into its social network platform, it may have had a significant impact on Google’s business, including its mobile search business. One June 2008 article described Facebook as the “Google of people.”<sup>378</sup> A memo sent to Google’s Board of Directors in October 2007 evidences Google’s fear about Facebook.

*In addition to allowing annotation from experts at the global level, we need to find ways for individuals to leverage the growing social graph of the web and our progress with apps to rank results based on trusted relationships within their social networks. Today, our Search strategy and our Apps strategy are separate architectural and product trajectories. The Facebook model has the property that it allows users to control identity at sale and in effect create an extended whitelist. If implemented properly this approach has the potential to threaten not only our applications products, but could ultimately evolve to produce a better search experience.*<sup>379</sup>

## 9. MONETARY RECOVERY FOR COPYRIGHT INFRINGEMENT

179. With respect to the measures of monetary recovery for copyright infringement,<sup>380</sup> 17 U.S.C. §504 – Remedies for Infringement: Damages and Profits – states, in part, that:

“(a) In General. -- Except as otherwise provided in this title, an infringer of copyright is liable for either –

- (1) the copyright owner’s actual damages and any additional profits of the infringer, as provided by subsection (b); or
- (2) Statutory damages, as provided by subsection (c).

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<sup>375</sup> GOOGLE-27-00002651 – 680 at 657.

<sup>376</sup> GOOGLE-5800021654 – 672 at 658.

<sup>377</sup> GOOGLE-26-00006162 – 6169, at 6163.

<sup>378</sup> GOOGLE-26-00004693 – 720 at 702.

<sup>379</sup> GOOGLE-26-00006162 – 6169, at 6163.

<sup>380</sup> See Section 12 below for a discussion of § 504(c) - Statutory Damages.



- (b) Actual Damages and Profits. – The copyright owner is entitled to recover the actual damages suffered by him or her as a result of the infringement, and any profits of the infringer that are attributable to the infringement and are not taken into account in computing the actual damages. In establishing the infringer’s profits, the copyright owner is required to present proof only of the infringer’s gross revenue, and the infringer is required to prove his or her deductible expenses and the elements of profit attributable to factors other than the copyrighted work.

## 10. ORACLE’S ACTUAL DAMAGES

180. In connection with determining the amount of actual damage Oracle has suffered, I have applied a “but-for” test which quantifies a portion of the additional profit Oracle would have achieved absent Google’s infringement (i.e. Oracle’s lost profits). My quantification of Oracle’s lost profits is based on a comparison of the actual results generated by Oracle’s licensing of Java ME, relative to the results it would have been generated “but-for” Google’s infringement. To that point, I note that although Oracle continued to license Java ME following Google’s infringement of the Java Copyrights, it did so at a declining rate. Notably, consistent with my description of how I calculated lost profits, Sun’s hesitation to authorize Google to use an open-source implementation of the Java technology was, in part, out of fear that it would decrease other Java licensing revenue.<sup>381</sup> In the following sections, I provide my analysis of Oracle’s lost Java ME profits. The analysis is based on a quantification of Oracle’s lost revenues, incremental costs, and ultimately Oracle’s lost profits attributable to its lost Java ME licensing revenue.

### 10.1 Oracle’s Java ME Lost Profits

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181. As discussed previously, Google tried unsuccessfully to negotiate a license to Sun’s Java technology, which included contemplation of an open source version of Java under an open source license, and one of Sun’s primary concerns during the failed negotiation was a substantial decline in Java ME licensing revenues.<sup>382</sup> Although Google was aware of this risk to Sun, and therefore understood that compensation under the license would need to account for any such lost licensing revenues, the failure to reach an agreement has resulted in Sun/Oracle having suffered losses for which it has not been compensated. The parties’ awareness of the negative impact an open source mobile Java platform not controlled by Sun would have on Sun’s licensing business is illustrated by the following bullet points:

- Internal correspondence from Tim Lindholm to Mr. Rubin discussing the compensation to Sun states: “for the risk of its loss...the price would be high” as

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<sup>381</sup> GOOGLE-01-00017143 – 144 at 143.

<sup>382</sup> GOOGLE-01-00019527-528 at 527-528. Deposition of Jeet Kaul, August 5, 2011, at p. 106. GOOGLE-12-00044903; GOOGLE-01-00017143-144 at 143.



“[t]hey fear an open source J2ME alternative will over time take the money out of the market for them.”<sup>383</sup>

- On October 11, 2005, Mr. Rubin passed on Alan Brenner’s (a Sun executive) concerns that an open source “J2ME VM” will make “licensing enforceability impossible for Sun, causing a loss of revenue.”<sup>384</sup>
- In 2006, Jonathan Schwartz spoke with Sergey Brin who acknowledged that he understood an open source Java ME would have a “severely negative impact on our [Sun’s] revenue streams.”<sup>385</sup>
- Also in 2006, Sun’s Scott McNealy told Mr. Schmidt that Sun’s revenue would decline as a result of Android and that while Sun was willing to take a risk with Java to do an Android deal with Google, “the economics of the Android impact and deal would need to be understood.”<sup>386</sup>
- Even after negotiations broke down, Google employees indicated that a licensing arrangement between Sun and Google was important to protecting Sun’s licensing business as Sun’s entire business model would collapse “[I]f Apache or anyone else develops Java code that the rest of us can use freely instead of paying money to Sun...”<sup>387</sup>
- Jeet Kaul, a former Sun employee, testified in deposition that Sun could lose “a billion dollars” based on projections of \$250 to \$300 million per year in annual Java revenue over three to four years.<sup>388</sup>

182. Sun/Oracle’s lost profits are further supported by the field-of-use (“FOU”) restrictions in Sun’s SE and ME licenses which were designed to protect Sun’s commercial license revenues.<sup>389</sup> To that point, Google understood that its use of the Apache Harmony Java SE libraries in Android violated the FOU restrictions in the licenses,<sup>390</sup> and the potential loss of those FOU restrictions was projected by Sun to result in a 25% annual drop in licensing revenue (from 2009 through 2011).<sup>391</sup> Furthermore, according to Sun’s Dave Bryant, abandoning the FOU restrictions without any counteraction was seen as tantamount to falling “off the cliff.”<sup>392</sup>

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<sup>383</sup> GOOGLE-12-00044903; GOOGLE-01-00017143 – 144 at 143.

<sup>384</sup> GOOGLE-01-00019527 – 528 at 527-528.

<sup>385</sup> OAGOOGL0013996761 – 762 at 761.

<sup>386</sup> GOOGLE-01-00065655.

<sup>387</sup> GOOGLE-14-00024408 – 409 at 408.

<sup>388</sup> Deposition of Jeet Kaul, August 5, 2011, at p. 106.

<sup>389</sup> GOOGLE-27-00002479; GOOGLE-40-00031156; Deposition of Jonathan Schwartz, July 20, 2011 at pp. 82 – 83.

<sup>390</sup> Deposition of Eric Schmidt, August 23, 2011, pp. 137-138, 152-155.

<sup>391</sup> OAGOOGL0000453751 – 752 at 752.

<sup>392</sup> OAGOOGL0000453751 – 752 at 752.





183. I have concluded from my review of Sun's business model at the time and the contemporaneous business records, including actual discussions between Sun and Google, that the fact of a loss to Sun in Java ME licensing revenue as a consequence of a Java-based Google open source platform for mobile phones was well known and accepted by both parties.

#### 10.1.1 Quantification of Lost Java ME Revenues

184. I have also concluded that the amount of this loss can be quantified with a reasonable certainty. Both Sun and Oracle created projections for Java ME licensing revenue. Over time, the impact of Google's infringement on the projections increased. As such, the projections were reduced several times to reflect ongoing declines in actual Java ME licensing revenue resulting from, for example, Oracle's inability to renew a number of Java ME licenses with Android OEM's such as HTC, LG, and ZTE.<sup>393</sup>
185. Around 2006, Sun announced that it would alter its approach to licensing and subsequently began offering a public license. However, I understand that most of Sun's existing ME commercial licensees declined to accept the open source license, as they wanted to keep their respective proprietary Java ME improvements, enhancements, and changes.<sup>394</sup> Under the new licensing approach, any modifications and improvements created by the licensee would face the risk of becoming non-proprietary due to the contribution-back requirements of the open source license.<sup>395</sup> So, although the new license structure could have had the potential of limiting future Java ME licensing revenue and expanding other Sun opportunities, it was not widely accepted by the community and thus does not appear to have had a material effect on Sun's business. Sun's licensees continued to pay Java ME license royalties and fees, at least until Android entered and then dominated the market, at which point many licensees chose not to renew their Java ME licenses.<sup>396</sup> Notably, although the assumptions changed after the advent of Android, and thus expected results from the forecasts were lowered, Oracle still failed to meet those lowered expectations.

#### 10.1.2 Java ME Projected Licensing Revenue

186. Several contemporaneous business records reflecting projected Java ME licensing revenue have been produced in connection with this matter.<sup>397</sup> Sun's Strategic Forecast created in 2008

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<sup>393</sup> Deposition of Michael Ringhofer, December 2, 2015, pp. 76-77.

<sup>394</sup> Deposition of Donald Smith, November 20, 2015, pp. 12-13, 26, 37, 78. Deposition of Michael Ringhofer, December 2, 2015, pp. 215-216. Deposition of Eric Chu, April 8, 2011, pp. 159-161. Deposition of Alan Brenner, December 15, 2015, pp. 204-207.

<sup>395</sup> Deposition of Donald Smith, November 20, 2015, pp. 12-13, 26, 37, 78. Deposition of Michael Ringhofer, December 2, 2015, pp. 215-216.

<sup>396</sup> Deposition of Michael Ringhofer, December 2, 2015, pp. 38-39, 76-77.

<sup>397</sup> The projections are for fiscal years which I understand runs from June 1 through May 31. For simplicity I simply state "2015"; however, this denotes data from June 1, 2015 through May 31, 2016.



- projected Java ME licensing revenue for 2009 and 2010 of \$129.7 million and \$140.4 million.<sup>398</sup> The notes to the forecast list “major shift to open source” as a consideration<sup>399</sup> and the forecast includes projections labeled “high,” “mid,” “low” and “strategic.” My analysis of Java ME licensing revenue considers the projection labeled “strategic” as I believe this projection is most in line with the business strategy given what was known at the time.<sup>400</sup>
187. I note that the projections reflected in the Strategic Forecast are supported by an October 2008 presentation titled Java in Wireless Business Review which includes four scenarios of Java ME revenue forecasts.<sup>401</sup> The “Best Estimate” forecast included in the Business Review projects Java ME revenue of \$110.3 million in 2009 and \$138.1 million in 2010, and is believed to be less encumbered by the existence of Android than the remaining scenarios which reflect lower projections.<sup>402</sup> Use of the “Best Estimate” in this alternative forecast would result in much greater damages than I have calculated because the growth rate from 2009 to 2010 in the “Best Estimate” is greater than the 8% reflected in the Strategic Forecast.<sup>403</sup>
188. Prior to the creation of each forecast, Sun was aware of the threat posed by Android to its business. For example, a December 10<sup>th</sup>, 2007 document titled Mobile: End + End, Shifting focus & monetization in the ‘post Android’ era states “Java ME under attack” and goes on to state “the most concerning of all is the combination of Android’s Dalvik VM + Linux.”<sup>404</sup> It goes on to indicate: “given their resources, Google will outspend and underprice us,”<sup>405</sup> in reference to the free price of Android, which was central to Sun’s declining expectations for Java ME licensing. Notably, Sun had experienced consistent monetization principles for over 15 years.<sup>406</sup>
189. For the purpose of my analysis, I have conservatively considered Sun’s 2008 forecast of Java ME licensing revenues to represent the best indication of Sun’s *but-for* revenue, despite the fact that it

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<sup>398</sup> OAGOOOGLE0100164541.

<sup>399</sup> OAGOOOGLE0100164541 at p. 5.

<sup>400</sup> OAGOOOGLE0100164541 at p. 3. Discussions with Michael Ringhofer.

<sup>401</sup> OAGOOOGLE0000142142 – 176 at slides 28 – 31.

<sup>402</sup> OAGOOOGLE0000142142 – 176 at slides 28 – 31. I note the second scenario decreases 2010 forecast revenue to \$123.5 million and specifically states that “competing technologies (Symbian, Android) provide operators with credible alternatives to Java” and although the third and fourth scenarios do not explicitly mention competing technologies they reflect revenues which are lower than scenario three. I also consider Java ME licensing projections prepared in later years to be less reflective of Sun’s but-for licensing revenues because they increasingly account for the impact of competition with Android resulting from Google’s infringement.

<sup>403</sup> Applying the same methodology I use in my calculation of Java ME licensing lost profits based on the “Best Estimate” would result in lost profits of approximately \$900 million.

<sup>404</sup> OAGOOOGLE0009784791-800, at 795.

<sup>405</sup> OAGOOOGLE0009784791–800, at 795.

<sup>406</sup> Deposition of Vineet Gupta, July 26, 2011, at p. 76.



was reduced in response to Google's infringement and no-cost pricing.<sup>407</sup> Although Sun's 2008 projections only include expectations for Java ME licensing revenue for complete fiscal years 2009 and 2010, I have relied on the 8.3% revenue growth rate across those two years to project ME licensing revenues through 2015.<sup>408</sup> I note my assumption is reasonable when compared to the fact that Sun projected overall Java billings growth from 2009 to 2014 of 8.0 percent to 13.6 percent<sup>409</sup> and, prior to the commencement of Google's infringement, Java ME licensing billings grew 75% from 2005 to 2006 and 22% from 2006 to 2007.<sup>410</sup> **Figure 23** reflects Java ME licensing revenue projections over the period 2009 to 2015. As seen in **Figure 23**, over that period, Sun expected to earn approximately \$1.17 billion from licensing Java ME over that period.

**Figure 23**

**Summary of Forecasted Java ME Licensing Revenue<sup>411</sup>**

|                                    | <u>2009</u>           | <u>2010</u>           | <u>2011</u>           | <u>2012</u>            |
|------------------------------------|-----------------------|-----------------------|-----------------------|------------------------|
| Total Forecasted Licensing Revenue | <u>\$ 129,696,000</u> | <u>\$ 140,399,000</u> | <u>\$ 151,985,252</u> | <u>\$ 164,527,644</u>  |
|                                    | <u>2013</u>           | <u>2014</u>           | <u>2015</u>           | <u>Total</u>           |
| Total Forecasted Licensing Revenue | <u>\$ 178,105,082</u> | <u>\$ 192,802,981</u> | <u>\$ 208,713,806</u> | <u>\$1,166,229,765</u> |

**10.1.3 Sun & Oracle's Actual Java ME Revenue**

190. Sun/Oracle's actual Java ME licensing revenue has been significantly less than what was forecasted even in 2008. By 2010, Sprint, Verizon, AT&T and T-Mobile had decreased their investment in Java ME in favor of Android.<sup>412</sup> Furthermore, a Sun FY2011 Java ME strategic overview for FY 2011 indicated that Android would "eliminate" more than \$45 million, or close to 50% of Java ME, in the subsequent eighteen months.<sup>413</sup>
191. As seen in **Figure 24**, Sun/Oracle's actual Java ME licensing revenues steadily increased over the years 2009 – 2012, before beginning to significantly decline in 2013.<sup>414</sup> One reason for the increase before 2013 is that Oracle's Java ME licensing revenues for 2011 and 2012 reflect pre-

<sup>407</sup> OAGOOGL0009707202 – 205 at 202-203.

<sup>408</sup> Exhibit 12.3.

<sup>409</sup> Exhibit 12.8.

<sup>410</sup> Exhibit 12.10.

<sup>411</sup> Exhibit 12.3.

<sup>412</sup> OAGOOGL0000799926.

<sup>413</sup> OAGOOGL0000457616-617, at 617.

<sup>414</sup> Exhibit 12.2.



payments for large license deals.<sup>415</sup> That fact, coupled with the lack of renewals in later years, explains why Java ME licensing revenue showed increases up to the year 2013. By way of example, Michael Ringhofer testified that, as a result of having to compete with free Android, Oracle recently entered into an approximately [REDACTED] licensing agreement with Samsung for the same technology Samsung had previously licensed for approximately [REDACTED].<sup>416</sup>

**Figure 24**

**Summary of Actual Java ME Revenue<sup>417</sup>**

|                                 | <u>2009</u>          | <u>2010</u>           | <u>2011</u>           | <u>2012</u>           |
|---------------------------------|----------------------|-----------------------|-----------------------|-----------------------|
| Total Java ME Licensing Revenue | <u>\$ 96,951,229</u> | <u>\$ 100,657,682</u> | <u>\$ 123,610,000</u> | <u>\$ 150,198,000</u> |
|                                 | <u>2013</u>          | <u>2014</u>           | <u>2015</u>           | <u>Total</u>          |
| Total Java ME Licensing Revenue | <u>\$ 86,754,824</u> | [REDACTED]            | [REDACTED]            | <u>\$ 608,568,092</u> |

192. As seen above, Sun and Oracle earned \$608,568,092 from Java ME licensing from 2009 to 2015.<sup>418</sup> Compared to the projected \$1.17 billion Java ME licensing revenue for the same time period, Oracle fell significantly short of its forecasts.

#### **10.1.4 Lost Java ME Revenue**

193. I have calculated Oracle's lost Java ME revenue by comparing the amount of revenue that was forecasted to the amount of revenue that was actually earned. As seen in **Figure 25**, based on that analysis, I have quantified lost Java ME licensing revenue to be approximately \$557.7 million.<sup>419</sup> I note that such a claim for lost Java ME revenue is consistent with Michael Ringhofer's testimony that Oracle has earned less licensing revenue as a result of Android.<sup>420</sup>

<sup>415</sup> Conversations with Michael Ringhofer and Edward Senteno.

<sup>416</sup> Deposition of Michael Ringhofer, December 2, 2015, pp. 68-69.

<sup>417</sup> Exhibit 12.4.

<sup>418</sup> Exhibit 12.4.

<sup>419</sup> Exhibit 12.2.

<sup>420</sup> Deposition of Michael Ringhofer, December 2, 2015, pp. 38-39.



**Figure 25**  
**Summary of Java ME Lost Revenues<sup>421</sup>**

|                                      | <u>2009</u>       | <u>2010</u>        | <u>2011</u>        | <u>2012</u>        |
|--------------------------------------|-------------------|--------------------|--------------------|--------------------|
| Forecasted Java ME Licensing Revenue | \$ 129,696,000    | \$ 140,399,000     | \$ 151,985,252     | \$ 164,527,644     |
| Java ME Licensing Revenue            | <u>96,951,229</u> | <u>100,657,682</u> | <u>123,610,000</u> | <u>150,198,000</u> |
| Lost Java ME Licensing Revenue       | <u>32,744,771</u> | <u>39,741,318</u>  | <u>28,375,252</u>  | <u>14,329,644</u>  |
|                                      | <u>2013</u>       | <u>2014</u>        | <u>2015</u>        | <u>Total</u>       |
| Forecasted Java ME Licensing Revenue | \$ 178,105,082    | \$ 192,802,981     | \$ 208,713,806     | \$ 1,166,229,765   |
| Java ME Licensing Revenue            | <u>86,754,824</u> |                    |                    | <u>608,568,092</u> |
| Lost Java ME Licensing Revenue       | <u>91,350,258</u> |                    |                    | <u>557,661,673</u> |

#### 10.1.5 Java ME Incremental Costs

194. In connection with determining the amount of lost profits associated with the Java ME lost revenue discussed above, I have considered the appropriate amount and type of incremental expenses to deduct from those lost revenues. My analyses in that regard are discussed in the sections that follow.

##### *Oracle Incremental Costs*

195. I understand Oracle does not maintain costs and expenses that are specific to Java ME. Rather, I understand Oracle accounts for such costs with Java overall.<sup>422</sup> Therefore, I have relied on Oracle's overall Java profit and loss statements to determine the appropriate amount of incremental expense to deduct from Oracle's lost Java ME licensing revenue.

196. In the course of making that determination, I considered a source of Java cost information reflecting Java licensing expenses for 2010 – 2015, which ranged from 9.5 percent to 17.6 percent.<sup>423</sup> With regard to the type of expenses included in the costs reflected on the document, I understand Oracle's Java Finance Controller, Mr. Edward Senteno, testified that licensing related expenses include salaries, commissions, bonuses, travel, facility allocation, benefit allocation, marketing, and miscellaneous costs.<sup>424</sup>

197. In addition to the document discussed above, I have also reviewed a Java P&L statement for 2013 - 2015. While the overall revenue and cost information reflected in that document is the

<sup>421</sup> Exhibit 12.2

<sup>422</sup> Deposition of Edward Senteno, November 18, 2015, at 61.

<sup>423</sup> Exhibit 12.1.

<sup>424</sup> Deposition of Edward Senteno, November 18, 2015, at 42.



same as the 2010 - 2015 document, it contains additional detail pertaining to the specific expense categories considered in the analysis.<sup>425</sup> The specific cost categories reflected on the P&L statements include employee-related expenses, marketing communications, facilities, and professional and recruiting fees. I understand that prior to 2013, Oracle did not maintain an “all-inclusive” Java profit and loss statement similar to that just described.<sup>426</sup>

198. Based on my discussions with Mr. Senteno, I understand all of the costs in the 2011-2015 document were necessary to complete a sale of a Java ME license. Therefore, I have considered all of those expenses to be incremental. A summary of Oracle’s incremental Java licensing expenses can be seen in **Figure 26**.

**Figure 26**

**Summary of Oracle’s Incremental Java Licensing Expenses<sup>427</sup>**

|                           | 2011           | 2012           | 2013           | 2014 | 2015 | Total           |
|---------------------------|----------------|----------------|----------------|------|------|-----------------|
| Java Licensing Revenue    | \$ 250,194,000 | \$ 285,100,000 | \$ 316,061,000 |      |      | \$1,206,852,706 |
| Java Licensing Expense    | 25,061,042     | 27,947,000     | 30,037,000     |      |      | 139,812,476     |
| Expense as a % of Revenue | 10.0%          | 9.8%           | 9.5%           |      |      | 11.6%           |

***Sun Incremental Costs***

199. A Sun FY07 MEP Business Presentation includes a 2006 Java ME profit & loss statement.<sup>428</sup> This profit and loss statement identifies COGS, engineering, marketing and sales expenses for all four quarters of 2006. Overall, 2006 COGS represent 7.6 percent of revenue, and I consider such costs to be incremental.<sup>429</sup> I also consider sales expense to be incremental because it is a consistent 10% of revenue for each quarter. With regard to Engineering and Marketing expense, I do not consider either to be incremental as they have no apparent relationship to sales. To that point, I note that not only do quarterly marketing expenses not fluctuate with revenue, they even declined as revenue increased from Q3 to Q4.<sup>430</sup>
200. While the 2006 P&L statement predates the damages time period, more current P&L data for Java ME has not been produced. Thus, I believe the 2006 P&L data provides a reasonable approximation of the incremental expenses Sun would have incurred to achieve the lost Java ME licensing revenues in 2009 and 2010. My belief in that regard is supported by a Sun October 2009 “SMI Operations Review” presentation that includes an overall Java P&L which indicates

<sup>425</sup> Exhibit 12.9.

<sup>426</sup> Deposition of Edward Senteno, November 18, 2015, at 125.

<sup>427</sup> Exhibit 12.6.

<sup>428</sup> OAGOOGL0005039944 - 962, at 946.

<sup>429</sup> Exhibit 12.7.

<sup>430</sup> Exhibit 12.7.



actual COGS of 8.6 percent of revenue for 2008, and projected COGS as a percentage of revenue of 11.6 percent and 10.7 percent of revenue for 2009 and 2010.<sup>431</sup>

201. Therefore, based on the 2006 Java ME profit & loss statement included in the Sun FY07 MEP Business Presentation, I have considered Sun's incremental Java ME licensing expenses to be 17.6 percent of sales during the years 2009 and 2010 (7.6 percent COGS and 10 percent selling expense).

***Total Incremental Costs***

202. As discussed in the previous sections, I have considered the incremental expenses related to Java ME licensing to range from 9.5 percent to 17.6 percent. Therefore, to approximate the amount of incremental expenses associated with the lost Java ME licensing revenues I have multiplied those incremental cost percentages by the amount of lost licensing revenue. A summary of my incremental expense calculations is reflected in **Figure 27**.

**Figure 27**

**Summary of Java ME Licensing Incremental Expenses<sup>432</sup>**

|                                | <u>2009</u>      | <u>2010</u>      | <u>2011</u>      | <u>2012</u>       |
|--------------------------------|------------------|------------------|------------------|-------------------|
| Lost Java ME Licensing Revenue | \$ 32,744,771    | \$ 39,741,318    | \$ 28,375,252    | \$ 14,329,644     |
| Incremental Expense % Total    | 17.58%           | 17.58%           | 10.02%           | 9.80%             |
| Incremental Expenses           | <u>5,757,473</u> | <u>6,987,667</u> | <u>2,842,248</u> | <u>1,404,667</u>  |
|                                | <u>2013</u>      | <u>2014</u>      | <u>2015</u>      | <u>Total</u>      |
| Lost Java ME Licensing Revenue | \$ 91,350,258    |                  |                  | \$ 557,661,673    |
| Incremental Expense % Total    | 9.50%            |                  |                  | 14.75%            |
| Incremental Expenses           | <u>8,681,513</u> |                  |                  | <u>82,248,738</u> |

**10.1.6 Java ME Licensing Lost Profits**

203. To determine Oracle's lost profits relating to Java ME licensing, I have subtracted the incremental expenses from the lost revenues discussed in the previous sections. Based on those calculations, I have determined that Oracle's lost profits relating to Java ME licensing equal approximately \$475.4 million. A summary of my calculation can be found in **Figure 28**.

<sup>431</sup> OAGOOGL0003973858 – 954 at 910.

<sup>432</sup> Exhibit 12.1.





Figure 28

Java ME Licensing Lost Profits<sup>433</sup>

|                                | 2009                 | 2010                 | 2011                 | 2012                  |
|--------------------------------|----------------------|----------------------|----------------------|-----------------------|
| Lost Java ME Licensing Revenue | \$ 32,744,771        | \$ 39,741,318        | \$ 28,375,252        | \$ 14,329,644         |
| Incremental Expenses           | 5,757,473            | 6,987,667            | 2,842,248            | 1,404,667             |
| Lost Java ME Licensing Profits | <u>\$ 26,987,299</u> | <u>\$ 32,753,651</u> | <u>\$ 25,533,004</u> | <u>\$ 12,924,977</u>  |
|                                | 2013                 | 2014                 | 2015                 | Total                 |
| Lost Java ME Licensing Revenue | \$ 91,350,258        |                      |                      | \$ 557,661,673        |
| Incremental Expenses           | 8,681,513            |                      |                      | 82,248,738            |
| Lost Java ME Licensing Profits | <u>\$ 82,668,745</u> |                      |                      | <u>\$ 475,412,935</u> |

## 10.2 Java FX Mobile (“Acadia”)

204. In addition to evaluating Oracle’s lost profits relating to Java ME, I have also considered the negative impact of Android on Oracle’s ability to launch project Acadia. In the first half of 2007, Sun undertook a project to develop a Java-Linux full software stack mobile platform named Java FX Mobile. The project was assigned code name “Acadia.”<sup>434</sup> Acadia had been in the planning stages since at least January 2006 when Sun considered acquiring SavaJe Technologies, Inc., a startup that was developing a Java/Linux-based full mobile stack. The SavaJe mobile platform was similar to Android – a Linux based system including middleware and an application development environment,<sup>435</sup> and Sun’s motivation for considering the acquisition was the opportunity to grow “mobile embedded revenue by offering a complete, integrated vertical phone stack that will enable Sun to provide more value to handset manufacturers thus enabling increased per unit device royalties.”<sup>436</sup>
205. Sun ultimately acquired SavaJe in April 2007 for \$13 million.<sup>437</sup> In a public announcement discussing the acquisition, Sun described SavaJe as a “highly customizable, integratable phone solution centered on Java” that would “strongly contribute to Sun’s future competitive position

<sup>433</sup> Exhibit 12.

<sup>434</sup> OAGOOGL0000337463. The full stack project was part of a larger Java FX strategy at Sun. When Sun chose not to offer the full stack, it used the Java FX Mobile name for a UI layer.

<sup>435</sup> OAGOOGL0000337463; OAGOOGL0002304235; OAGOOGL0002304236 – 243 at 237; 242 – 243; OAGOOGL0000361417 – 418 at 417; OAGOOGL0001700059 – 061 at 061.

<sup>436</sup> OAGOOGL0000337463; OAGOOGL0002304235; OAGOOGL0002304236 – 243 at 237; 242 – 243; OAGOOGL0000361417 – 418 at 417; OAGOOGL0001700059 – 061 at 061.

<sup>437</sup> OAGOOGL00006231006 – 033 at 025; OAGOOGL0000473609 – 612; OAGOOGL0000424812 – 813 at 812.



in the mobile technology market.”<sup>438</sup> Sun’s Brian Sutphin believed that SavaJe’s technology could become “one of the premier mobile platforms in the industry,” now that it was a part of Sun.<sup>439</sup> In addition to the Java/Linux-based mobile platform, Sun also acquired skilled engineers and intellectual property resources that, combined with Sun’s expertise, enabled it to efficiently develop a Java/Linux-based mobile platform.<sup>440</sup>

206. The “Development Timeline” for Acadia specified R&D efforts beginning in 2007 and an October 2008 deployment.<sup>441</sup> Sun’s relatively quick plan to use the SavaJe technology in combination with Java ME and Java Mobile FX to create a mobile platform is supported by the fact that the developer community was largely trained to code in the Java platform. Furthermore, Mr. Gupta testified that “a lot of [our] customers did not expect Android would work and they wanted to continue working with Java.”<sup>442</sup> Mr. Gupta further testified that the Java FX mobile strategy included adding scripting language support for easy UI (user interface) development into the platform, which is a direction Android was trying to go as well.<sup>443</sup>
207. During the time that Sun was developing Acadia, it was also going through a companywide restructuring. Although Acadia was considered in the restructuring, the team focused on executing Acadia was unaffected. An internal Sun email sent in November 2008 indicates that the Sun layoffs were “going after simplifying the field and our processes, to get to industry benchmark productivity” and that Sun was “NOT [sic] making wholesale changes to our technology roadmap or skillset.”<sup>444</sup> The majority of the layoffs associated with the restructuring took place more than a year after Project Acadia commenced and were not directly related to the project or its team.
208. Acadia was based on a combination of Java ME and Java FX Mobile and was aimed at the smartphone market, which was beginning to emerge at the time. As such, Acadia was positioned to compete with other mobile platforms such as Symbian, BlackBerry, iOS and Android (assuming it existed without Google’s infringement).
209. Sun’s efforts to develop its own complete Java/Linux mobile platform were strategic and described as a key marketing strategy to OEMs.<sup>445</sup> Just like Google, in 2006 Sun realized that it

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<sup>438</sup> OAGOOGL0006231006 – 033 at 25; OAGOOGL0000473609 - 612; OAGOOGL0000424812 – 813 at 812.

<sup>439</sup> OAGOOGL010016779.

<sup>440</sup> OAGOOGL0004950038-063 at 054; OAGOOGL0000345591; OAGOOGL00009694914 – 915.

<sup>441</sup> OAGOOGL0004950038-063 at 054; OAGOOGL0000345591; The Development Timeline is consistent with other documentary evidence. One document indicates that the first devices should be shipped in mid-2008 (Fiscal Year 2009) in time for the 2008 holiday shopping season, OAGOOGL00009694914 – 915 at 914.

<sup>442</sup> Deposition of Vineet Gupta, July 26, 2011, pp. 135-136.

<sup>443</sup> Deposition of Vineet Gupta, July 26, 2011 p. 371.

<sup>444</sup> OAGOOGL0003900673 – 674 at 673.

<sup>445</sup> OAGOOGL0004936380 – 436 at 396.



needed to release a smartphone product soon, or it could “miss [the] market window.”<sup>446</sup> Therefore, Sun made a concerted effort to partner with both OEMs and carriers in an attempt to get a product to market by October 2008 – the same month Google launched Android.<sup>447</sup> By the middle of 2007, Sun had met with wireless carriers such as AT&T, Verizon, Sprint, Vodafone and Orange (France), with AT&T and Vodafone exhibiting the greatest interest.<sup>448</sup> The OEMs solicited by Google included Samsung, LG, Motorola, Nokia, Sony Ericsson and UT Starcomm.<sup>449</sup>

210. Although Sun’s development of a mobile platform occurred with the knowledge that Google was working on its own competitive platform, prior to the release of Android Sun did not know how similar Android was to Acadia.<sup>450</sup> That said, an internal Google email noted the similarity of Android to Savaje, because the phone applications in both platforms were Java apps.<sup>451</sup> Furthermore, it appears Google was aware of Sun’s development efforts as early as May of 2007, when Mr. Rubin stated that he anticipated Sun announcing a mobile platform in the coming week.<sup>452</sup>
211. In November 2007, Omer Pomerantz of Sun wrote that the Android SDK “is very similar (almost identical) to the Savaje stack/vision... Will Sun see royalties from every ‘Android’ device? (it’s Java inside, but uses this ‘DEX’ format...)”<sup>453</sup> Android’s similarity to Acadia and no-cost pricing was also discussed by Sun in a January 2008 call to update forecasts as a result of Android’s impact on Sun’s diminishing royalties.<sup>454</sup> In addition to OEMs backing out of potential Acadia partnerships, Sun also realized that even if OEMs went with Android and failed, it would be “locked out for 2 years.”<sup>455</sup> Finally, Martin Lister of Sun realized that a free-of-charge Android system backed by Google could not be matched by Sun.<sup>456</sup>
212. Although Sun recognized that Android was no-cost, Sun did not know that, in fact, Google was sharing ad and application revenue with carriers and OEMs to gain distribution. Therefore, Sun was competing with “paid off” not “free of charge.” That is, Sun was trying to charge a license fee to OEMs who could instead pay nothing at all for the software and in addition receive large market distribution payments. As a result, Sun could not overcome Google’s ability to offer

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<sup>446</sup> OAGOOGL0004936380 – 436 at 404.

<sup>447</sup> OAGOOGL0005117411 – 419 at 414.

<sup>448</sup> OAGOOGL0009694914 – 915 at 914.

<sup>449</sup> OAGOOGL0009694914 – 915 at 915.

<sup>450</sup> OAGOOGL0002546260.

<sup>451</sup> GOOGLE-17-00063063.

<sup>452</sup> GOOGLE-26-00005730.

<sup>453</sup> OAGOOGL0002546260.

<sup>454</sup> OAGOOGL0009707202 – 205 at 202-203.

<sup>455</sup> OAGOOGL0000387642 – 647 at 643; OAGOOGL0002778476 – 482 at 477.

<sup>456</sup> OAGOOGL0000488495 – 497 at 495 - 497.



lucrative ad-based revenues associated with Android search services that Google was generating through the use of Sun's own technology.<sup>457</sup>

213. Ultimately, by 2009 Project Acadia was cancelled.<sup>458</sup> Sun abandoned the project following the release of Android, which provided too great a barrier to entry. As discussed by Oracle's Larry Ellison during his deposition, Oracle could not bring another smartphone platform to market due to Android's use of Java:

*"It's very hard to go out and compete against our own IP when someone else is giving that IP away for free."*<sup>459</sup>

214. Furthermore, Mr. Gupta provided the following testimony in his deposition regarding the overlap of Android on Sun's mobile strategy:

*"Our roadmap of where we were going with Java, their roadmap of what they were doing with Android, at several levels would compete. It would compete in the level of cost. It would compete in the level of somebody who had a full ecosystem, developer content, ISE, application against ours. Ours was more open. Their's was seemingly open because of the freeness attached to it. Ours had encumbrances, both legal, community process requirements, requirements of not duplicating efforts. Their's, do what you want. So there were several levels of issues that it would cause in the ecosystem between our strategy and their's.*

...

*What -- the statement should be is both of us had exactly the same plans and same strategies for the same market with exactly the same developers and community. We were just executing them separately. So everything overlapped. And these are words from Andy Rubin himself as well."*<sup>460</sup>

215. The amount of losses attributable to the loss of the Acadia platform is very difficult to quantify since the product never achieved distribution agreements nor launched. In my view it is reasonable to consider that, in the absence of Google's infringement of the Java Copyrights, Acadia had the opportunity to capture a material portion of the mobile platform market. The value proposition of Acadia and Android was the same—a full stack mobile platform based on Java and Linux. Acadia was poised to capitalize on the Java developer base in the same way as Android. Acadia was poised to capitalize on the market window for mobile in the same way as Android. Acadia was poised to capitalize on the increasing technical capabilities of phone devices as was Android. And Sun had lengthy experience managing dual licensing schemes.
216. Had Google been delayed for a significant period in its entry to market by having to develop its own APIs rather than using the 37 Java APIs from the Java Copyrights, it is possible that Acadia

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<sup>457</sup> Deposition of Georges Saab, December 16, 2015 at, pp. 68-69; Deposition of Michael Ringhofer, December 2, 2015, at pp.69-70.

<sup>458</sup> OAGOOGL0000489218 – 219 at 218; OAGOOGL0000653841.

<sup>459</sup> Deposition of Larry Ellison, August 12, 2011, pp. 63-64.

<sup>460</sup> Deposition of Vineet Gupta, July 26, 2011, pp. 371-373.



could have captured the Java-based smartphone field. In any event, faced with a similar situation where it was otherwise excluded from the Apple iOS platform, Google paid billions of dollars in revenue sharing to distribute its search services on another company's platform.<sup>461</sup>

217. Therefore, I believe Sun and later Oracle's actual losses attributable to the lost Acadia opportunity could be quite significant, and, potentially best measured by the apportioned Android profits attributable to the Infringed Java Copyrights. In other words, Google's Android-related profits represent, in some part, Sun and Oracle's inability to pursue the exact same market opportunity for a Linux/Java SE based smartphone because Google was competing against them using their own Java Copyrights.

### 10.3 Other Actual Losses

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218. It should also be noted that my calculation of Oracle's losses is conservative in that it does not reflect additional losses claimed by Oracle which stem from Google's improper use of the Infringed Java Copyrights. To that point, I understand Oracle's efforts to license Java for a variety of devices including, but not necessarily limited to, wearables, automotive, televisions, media players, game consoles, web browsers, and household appliances have all been hindered by competition from Android.<sup>462</sup>

## 11. GOOGLE'S PROFITS ATTRIBUTABLE TO THE INFRINGEMENT

### 11.1 Causal Nexus for the Revenues Attributable to the Infringement

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219. As discussed above, I understand Oracle is entitled to any profits generated by Google which are attributable to the infringement and not taken into account in computing its actual damages. My evaluation of Google's profits begins with the identification and evaluation of the revenues Google derived from the infringement of the Java Copyrights.<sup>463</sup> To that point, I understand that under §504(b), a "causal nexus" between the infringement and the monetary remedy sought is a predicate to the recovery of infringer's profits.<sup>464</sup>
220. I am qualified to evaluate the causal connection between Google's revenues and the Infringed Java Copyrights based, in part, on my experience as a licensing professional who regularly assists clients with the valuation of intellectual property, both inside and outside of litigation. More specifically, I have experience negotiating licensing/sale agreements for intellectual property assets, the terms of which are predicated on identifying the specific economic benefits derived from the intellectual property being licensed. I am also qualified based on my experience as a

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<sup>461</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 16-17.

<sup>462</sup> Oracle's First Supplemental Responses and Objections to Google's Seventh set of Interrogatories, pp. 1-3.

<sup>463</sup> Order Re Willfulness and Bifurcation, *Oracle America Inc. v. Google Inc.*, No. C 10-03561, September 18, 2015, p. 6.

<sup>464</sup> *Polar Bear Prods., Inc. v. Timex Corp.*, 384 F.3d 700, 708-09 (9th Cir.2004); *Brocade Communs. Sys. v. A10 Networks Inc.*, 2013 U.S. Dist. LEXIS 8113, \*29-30 (N.D. Cal. Jan 10, 2013).



financial professional and Certified Public Accountant who regularly assists clients with the evaluation of potential businesses and markets that could possibly be created from the development and commercialization of intellectual property. Based on that experience and my review of the evidence produced in connection with this matter, as discussed in detail in the following sections, I have concluded that revenues derived by Google through the sale of hardware, apps, digital content and advertising have a causal nexus to the Infringed Java Copyrights. My opinions related to causal nexus herein include consideration of the totality of the evidence discussed herein.

221. After identifying the sources of revenues which are causally connected to the Infringed Java Copyrights, I quantified those revenues based on the financial records and other data provided by Google.
222. After quantifying the causally connected revenues, I subtracted the cost of sales and operating expenses that actually helped generate those revenues. Those costs and expenses were often reflected in contemporaneous business records prepared by Google to report periodic Android-related operating results to the Android Operating Committee and other Google executives. I would note that although Google has the burden to prove its claimed deductible expenses,<sup>465</sup> based on Google's business records and related deposition testimony, I believe I can accurately identify the costs and expenses incurred by Google in connection with generating the Android-related revenues discussed above.

#### 11.1.1 Causal Nexus to the Java APIs

223. The revenues causally connected to the Infringed Java Copyrights were identified, in part, based on Google's business records, the sworn testimony of Google witnesses, and the expert reports and opinions of other experts in this case. As discussed previously, Google implemented a four phase strategy for Android which was dependent upon the use of a "Leading Software Platform" to build an "Ecosystem."<sup>466</sup> In October 2007, then-Google CEO Eric Schmidt wrote to Google board of directors that Google's end goal is to "enable an open ecosystem for the mobile world and create a standard, open software platform for Java-based mobile software."<sup>467</sup> Mr. Schmidt advised that this goal "will take patience and many years of investment before it pays dividends."<sup>468</sup>
224. A July 2005 Google presentation illustrated Google's early acknowledgement of the benefits and its need for the Java Platform.<sup>469</sup> To that point, I understand some of the specific benefits provided by the use of the Java Platform include at least the following:

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<sup>465</sup> 17 U.S.C. §504; Order Re Willfulness and Bifurcation, *Oracle America Inc. v. Google Inc.*, No. C 10-03561, September 18, 2015, p. 6.

<sup>466</sup> GOOGLE-21-00008118 – 139, at 131; GOOGLE-21-00008116 – 117.

<sup>467</sup> GOOGLE-26-00006035 – 6042, at 6038.

<sup>468</sup> GOOGLE-26-00006035 – 6042, at 6038.

<sup>469</sup> GOOGLE-00-00001772 – 781, at 779.



- *Allows for Faster Programming*
- *Access to Java Developers*
- *Increased Speed to Market*
- *Lack of Available Alternatives*

225. ***Allows for Faster Programming:*** Similar to the other API packages included within the Java software platform, the 37 API packages avail “ready-to-use” programs that perform useful and robust computer functions without the need for developers to write code for these functions from scratch.<sup>470</sup> The use of the 37 API Packages by computer programmers thus save time and money when developing programs.

226. The familiarity of the set of APIs provided an advantage that Bornstein acknowledged when he said “it made sense to provide implementations of a set of classes with particular familiar names and methods with particular familiar names along with, you know, to the extent that we could, familiar behavior.”<sup>471</sup> I understand that Anwar Ghuloum also agreed when he referred to the core libraries and said “Yeah. Familiarity, I think, would be a value.”<sup>472</sup> Similarly, John Duimovich of IBM testified that familiarity with APIs helps improve developer performance.<sup>473</sup>

227. ***Access to Java Developers:*** The ease of use and familiarity of the 37 Java API packages act as incentives to attract Java programmers to the Android platform. Bob Lee, head of Android’s core library team at Google, agreed in his deposition that the 37 API packages included in Android “are [the] good stuff from Java.”<sup>474</sup> Reto Meier, an Android developer advocate at Google since 2009, testified that Google copied the core Java APIs into Android instead of creating its own because “utilizing the same [Java APIs] would make it easier for folks to -- to use [Android] if they had experience with [the Java APIs].”<sup>475</sup>

228. This enabled Google to take advantage of a very large installed base of application developers already familiar with these APIs. This benefit was described by Mr. Rubin during his deposition. According to Mr. Rubin:

*“So I think pretty consistently throughout the development of Android we referred – we really wanted to enable the third-party developer ecosystem in a way where the developers were using tools that they were familiar with. I didn’t want to go invent some new thing that developers had to go to school to learn how to program; right, and as I mentioned earlier, a lot of college course work teach the Java*

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<sup>470</sup> Expert Report of Chris F. Kemerer, January 8, 2016, pp. 10-11.

<sup>471</sup> Deposition of Daniel Bornstein, May 16, 2011, p. 110.

<sup>472</sup> Deposition of Anwar Ghuloum, December 9, 2015, p. 18.

<sup>473</sup> Deposition of Anwar Ghuloum, December 9, 2015, p. 18; Deposition of John Duimovich, December 21, 2015, pp. 150-151.

<sup>474</sup> Deposition of Bob Lee, August 3, 2011, p. 48.

<sup>475</sup> Deposition of Reto Meier, December 11, 2015, p. 113.





*programming language. So Java as the programming language is really, really important to our solution because developers can just jump on it without learning something new and, in fact, going back to college. So I think that given the importance of ecosystems in the era of smart phones and app stores and everything else, that the Java programming language was really, really important to us.”*<sup>476</sup>

Mr. Bornstein reiterated this point when he said “well, so I think Android succeeded in providing a familiar enough environment for application developers to use”<sup>477</sup> and the “application developers use the familiarity in their head when they’re – when they’re working with Android”<sup>478</sup> Mr. Ghuloum agreed that familiarity with the 37 API packages would “allow[] programmers to more readily develop programs . . . .”<sup>479</sup>

229. **Increased Speed to Market:** Because of their familiarity with the Java APIs, programmers are able to develop new programs and get products to market more quickly. Indeed, Google’s incorporation of the 37 APIs significantly accelerated Google’s own time to market with a platform that was robust and stable, thus enabling programmers to achieve that specific benefit of increased speed to market of their Android applications.
230. Had Google opted to develop its own code, as opposed to using the 37 Java APIs, I understand it is reasonable to expect Google would have taken approximately 10 years for that code to reach maturity and stability.<sup>480</sup> I understand that maturity and stability of an API makes development much easier and predictable for application programmers using that platform. I further understand that Google did not have an extra 10 years to develop its own code. Google acquired Android by June 2005 and released its first Android API in November 2007, a schedule that disappointed Google’s top executives. Google had bargained with Android Inc.’s principals for milestone payments designed to reach a release in three years. By November 2006, Google President and CEO Larry Page stated in an executive mobile strategy meeting that he was “[d]isappointed in Android’s timing.”<sup>481</sup> According to Mr. Rubin, “[s]o our desire was to use the Java programming language, accelerate our schedule and license the virtual machine from Sun. . . .”<sup>482</sup> Rubin explained to Google’s Executive Management Group (“EMG”) in a February 2006 presentation that a license from, or partnership with, Sun was “[c]ritical to [Google’s] open source handset strategy” and would “[d]ramatically accelerate[] [Google’s] schedule.”<sup>483</sup>

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<sup>476</sup> Deposition of Andrew Rubin, July 27, 2011, pp. 122-123.

<sup>477</sup> Deposition of Daniel Bornstein, May 16, 2011, p. 103.

<sup>478</sup> Deposition of Daniel Bornstein, May 16, 2011, p. 104.

<sup>479</sup> Deposition of Anwar Ghuloum, December 9, 2015, p. 18.

<sup>480</sup> Expert Report of Chris F. Kemerer, January 8, 2016, p. 35.

<sup>481</sup> Deposition of Larry Page, August 24, 2011, pp. 73-74; GOOGLE-26-0031099.

<sup>482</sup> Deposition of Andrew Rubin, July 27, 2011, p. 124.

<sup>483</sup> GOOGLE-12-00079182 – 194 at 186.



231. I also understand that, had Google chosen to make its own code offering for these 37 APIs, it likely would have suffered initially from errors and instability.<sup>484</sup> Mr. Ghuloum indicated the problems inherent in unstable code when he said “Yeah, absolutely. We switched our runtime over, and there were growing pains associated with that.”<sup>485</sup> Therefore, I understand that any code that Google independently developed in order to meet its two-year target for market introduction, would have risked disappointing (and perhaps alienating) developers and consumers alike. Copying the Infringing Java Copyrights therefore provided Google with the ability to meet its specific timing window with a stable and familiar API from the Java platform, thus capitalizing upon the same potential market opportunity that Sun lost with Acadia.<sup>486</sup>
232. ***Lack of Available Alternatives:*** In addition to providing Google with the benefits described above, I also understand there were no commercially acceptable alternatives available to Google given its perceived market risks, other than to utilize the Infringed Java Copyrights as it did.
233. As an example, I understand Google did in fact consider using Microsoft’s C# language and the .NET framework as an alternative to Java, however, each of those alternatives is proprietary to Microsoft and would have necessitated a license between Google and Microsoft.<sup>487</sup>
234. Although Google could also have attempted to use C++ this would not have offered a built-in developer base with as many programmers as the Java platform, and created portability issues which Java did not have.<sup>488</sup> Objective-C was also evaluated as an alternative but Mr. Ghuloum explained that it would have been difficult to gain developer acceptance since “Objective-C is a fairly idiosyncratic language ... and clamped on this alternative syntax and alternative semantics, so I think there might have been a taste factor.”<sup>489</sup> Finally, Google could have developed its own language, but it would be slow to develop and would not have a strong initial programmer base. Mr. Hasan Rizvi, Senior Vice President of Development for Oracle, testified that “*even a company like Google chose Java because they didn't want to go try and invent a new language. So coming up with a new language is a big deal.*”<sup>490</sup> Further, “*Java is the most widely adopted platform in the history already; the most developers, the most devices, et cetera.*”<sup>491</sup> Furthermore, Mr. Bornstein enumerated reasons for the preference of Java for Android as follows:

*“[t]here was a good open source community around developers that use the Java programming language. There were good tools, such as Eclipse, that were other open source tools that worked with*

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<sup>484</sup> Expert Report of Chris F. Kemerer, January 8, 2016, p. 33.

<sup>485</sup> Deposition of Anwar Ghuloum, December 9, 2015 at p. 150.

<sup>486</sup> Expert Report of Chris F. Kemerer, January 8, 2016, p. 35.

<sup>487</sup> Email between Andy Rubin and Larry Page, October 11, 2005, GOOGLE-01-00019527 – 528 at 528; Deposition of Andrew Rubin, April 5, 2011, p. 107.

<sup>488</sup> Email from Brian Swetland to Mathias Agopian et al, January 2, 2006, GOOGLE-01-00019511 –513 at 512.

<sup>489</sup> Deposition of Anwar Ghuloum, dated December 9, 2015, p. 114.

<sup>490</sup> Deposition of Hasan Rizvi, dated July 28, 2011, p. 211.

<sup>491</sup> Deposition of Hasan Rizvi, dated July 28, 2011, p. 239.



*that programming language. There were already a number of good open source libraries written in the programming language.*

*So there's the social aspect, per se, that there were already developers who understood the Java programming language, could write in it, but also who were actively producing open source software. . .*

*I think the other main candidates were JavaScript and C++. . .*

*[B]etween Java and C++, it was what I would say is that C++ can be a little more troublesome in some circumstances. In terms of JavaScript versus Java, say, it was much less clear-cut. . .*

*I had had a reasonably positive experience using Java as the programming language for Danger.”<sup>492</sup>*

235. In an April 2006 message to Android engineers from Mr. Andy McFadden, engineers were instructed to code in the Java programming language because “[w]e will ship a more stable product sooner if we do as much as possible in Java.”<sup>493</sup> Mr. McFadden instructed that “[i]f there’s a simple, built-in Java way of doing things that works the way Java developers expect, favor that over inventing a new approach.”<sup>494</sup>
236. Developers do, of course, have the option of developing in non-Java code;<sup>495</sup> however Java is still the most widely used programming language. Additionally, although support exists for other types of input files, in practice no other source files are currently supported. Thus, although Android could theoretically support alternatives that do not include Java, I am unaware of any commercially practical steps taken by Google to move in that direction.
237. Google’s business records likewise evidence the lack of available acceptable alternatives. In an October 2005 e-mail, Mr. Rubin outlined the following options following “discussions with Sun regarding Android’s Open Source VM strategy”:
- “If Sun doesn’t want to work with us, we have two options: 1) Abandon our work and adopt MSFT CLR VM and C# language – or – 2) Do Java anyway and defend our decision, perhaps making enemies along the way.”<sup>496</sup>*
238. Almost five years later Google was still without a commercially acceptable alternative, as in August 2010 Mr. Rubin received an internal email stating that the technical alternatives to using

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<sup>492</sup> Deposition of Daniel Bornstein, dated May 16, 2011, pp. 48-50.

<sup>493</sup> Email from Andy McFadden to Dianne Hackborn and Android Engineering, April 4, 2006, GOOGLE-01-00075935 – 936 at 935.

<sup>494</sup> Email from Andy McFadden to Dianne Hackborn and Android Engineering, April 4, 2006, GOOGLE-01-00075935 – 936 at 935.

<sup>495</sup> Android Developers Reference Forum, <http://developer.android.com/tools/sdk/ndk/index.html>.

<sup>496</sup> GOOGLE-01-00019527 - 528 at 528.



Java for Android “all suck” and concluding, “we need to negotiate a license for Java under the terms we need.”<sup>497</sup>

***Android’s Technical Dependence on the Infringed Java Copyrights***

239. Once Google had decided on Java as its solution, according to the expert report of Chris F. Kemerer, Ph.D. (“the Kemerer Report”), and the Zeidman Report, collectively (the “Technical Reports”) the Infringed Java Copyrights exist within the Android. As described in the Technical Reports, the importance and dependence on the Java Copyrights within the Android platform have been tested and proven as follows:

- ✓ Android does not compile without the Infringed Java Copyrights<sup>498</sup>
- ✓ Every one of the Top 100 Apps depends on one or more of the 37 API packages. The average number of dependencies is 11.5. One of the top apps relies on as many as 23 of the 37 copied APIs.<sup>499</sup>
- ✓ If the analysis is restricted to the most popular of the 100 apps, the ones that have between 1 billion and 5 billion downloads, those apps generally have even more dependencies upon the 37 copied APIs, with the minimum number of dependencies being eight, the average number 13.8, and the maximum number 17.<sup>500</sup> Some examples of the popular app downloads that rely significantly on the Infringed Java Copyrights include Google Play Music, Games, Chrome, YouTube, Maps and Gmail.
- ✓ The 37 APIs are many more times more significant to the Android platform using a centrality analysis called PageRank (invented by and named after one of Google’s founders Larry Page) than the other APIs it utilizes.<sup>501</sup>

These analyses included in the Technical Reports illustrate the importance and centrality of the Infringed Java Copyrights to the operation and success of Android.

240. Google business records indicate that a Google objective relating to the incorporation of the Infringed Java Copyrights into the Android platform was to ensure and increase the ability of Java programmers to easily transition to Android App development.<sup>502</sup>

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<sup>497</sup> Trial Exhibit 10 – GOOGLE-12-10000022; GOOGLE-12-00039565; Deposition of Tim Lindholm, September 7, 2011, p. 78.

<sup>498</sup> Expert Report of Prof. Douglas C. Schmidt, January 8, 2016, p. 10.

<sup>499</sup> Expert Report of Chris F. Kemerer, January 8, 2016, p. 41.

<sup>500</sup> Expert Report of Chris F. Kemerer, January 8, 2016, p. 41.

<sup>501</sup> Expert Report of Chris F. Kemerer, January 8, 2016, pp. 43-45.

<sup>502</sup> Trial Exhibit 158 - GOOGLE-01-00025575 – 587 at 584.



***The Impact of the Infringed Java Copyrights on Google's Market Opportunity***

241. The Infringed Java Copyrights were essential for Google to establish Android in the wake of Apple's market entry and intense competitive pressure from Facebook. The rapid growth of the wireless industry and the infrastructure for significant mobile data bandwidth marked the widespread adoption of mobile devices and a fundamental and permanent shift from desktop to mobile internet access. The resultant window of opportunity would not have been available to Google without the marketplace business advantages provided by the Infringed Java Copyrights. Google recognized that it had to exploit this unique timing window in order to avoid having its services excluded by others from their platforms. All of Google's top executives agreed that one of their chief objectives for Android was to ensure control over a platform and to avoid the significant threat of such exclusion.<sup>503</sup> Google felt intense time pressure to get Android to market.<sup>504</sup> The stability and maturity of the existing Java API and its built-in developer base made it the only commercially viable choice for Google to reach its defined target timing window, in order to ensure the continued viability of its core search services on the mobile platform, and eventually every platform.
242. Given the above and other record evidence in this case, it is my opinion that a significant portion of the revenue Google has realized through the Android platform is causally connected to the Infringed Java Copyrights. The Android platform cannot exist without and disproportionately relies upon the Infringed Java Copyrights; in addition, the Infringed Java Copyrights were the only available option to succeed in the time window that Google required. Google's mobile strategy depended on the Android platform, and that platform depended upon the Infringed Java Copyrights. Google would not have earned tens of billions of dollars of Android revenue without the Android platform. In my opinion, Google's Android revenue is attributable in significant part to the Infringed Java Copyrights.
243. That Google has realized revenue because of the platform (and thus the Infringed Java Copyrights) is supported by the following slide taken from a Google Quarterly Review presentation to the Android Operating Committee which states that Android "spreads value" by having a "direct revenue impact."<sup>505</sup>

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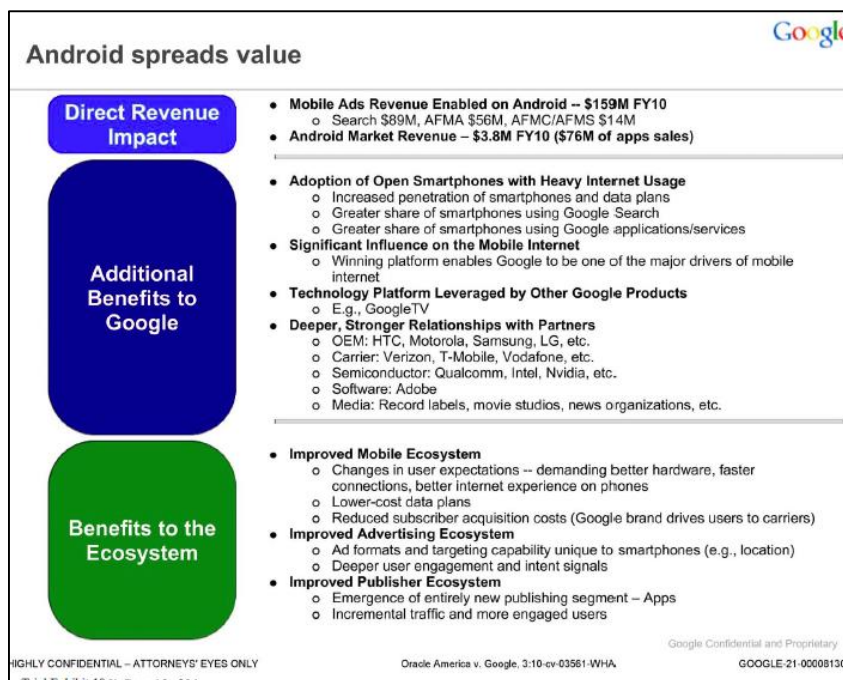
<sup>503</sup> GOOGLE-01-00056184 – 187 at 187; GOOGLE-22-00171914 – 951 at 923.

<sup>504</sup> OAGOOGL0004936380 – 436 at 404.

<sup>505</sup> GOOGLE-21-00008118 – 139 at 130; GOOGLE-21-00008116 – 117.



Figure 29  
Google Internal Presentation<sup>506</sup>



244. As discussed previously, I have specifically identified revenues derived by Google through the sale of hardware, apps, digital content and advertising to have a causal connection to the Infringed Java Copyrights. In the sections that follow, I provide my opinions regarding the causal connection of each of those revenue sources to the Infringed Java Copyrights.

#### 11.1.2 Causal Nexus to Device Revenue

245. Nexus is the brand name of Google’s smartphones and tablets. Nexus smartphones are sold directly to consumers. The first Nexus device was the Nexus One mobile phone (co-developed with HTC), launched in January 2010. Google’s Nexus business strategy has centered around ensuring a current and competitive Android device was available in the market.<sup>507</sup> The Nexus program has traditionally served as a way for Google to provide reference devices with the latest version of its software to developers.<sup>508</sup> Starting with the 2012 introduction of the Nexus 4,

<sup>506</sup> GOOGLE-21-00008118 – 139 at 130.

<sup>507</sup> GOOG-01-00053552 – 591 at 558.

<sup>508</sup> “Not just for phone nerds: Google calls Nexus 5 a sales winner,” The Verge, January 30, 2014.

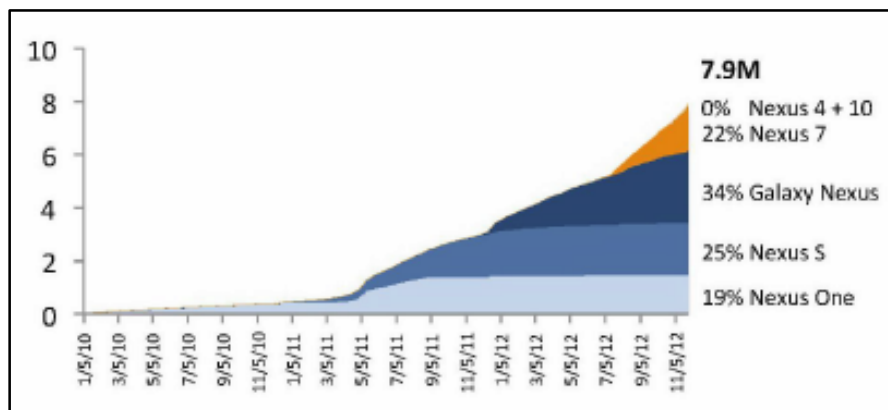


Google has also used it as a way to make high-end devices more accessible, by pricing them far below competing devices.<sup>509</sup>

246. From a marketing perspective, Google's strategic theme was to establish "pure Google" as a viable line of Nexus devices.<sup>510</sup> Google priced Nexus devices just above its own costs in order to maximize unit sales and distribution. Google also introduced a Nexus 10-inch tablet in 2012. UBS Securities estimated that the Nexus tablet was the biggest contributor to Nexus-related revenues, and comprised 10 percent of all Android tablet activations as of July 2013.<sup>511</sup>
247. Google business records indicate that an Android-related business objective has been the generation of revenue via the sale of hardware devices.
- **The Q1 2011 Android OC Report:** Indicates that Google realized \$115.2 million from sales of Nexus devices during 2010.<sup>512</sup>
  - **Google 2012 Mobile Update:** A November 2012 Mobile Update report by Mr. Rubin indicates that 2012 was "Mobile's biggest year yet." According to this report, during 2012, 1.7 million Nexus 7s were activated.<sup>513</sup> By November 2012, a cumulative total of 7.9 million Nexus devices had been activated. **Figure 30** below illustrates Nexus activations by model from January 2010 to November 2012.

**Figure 30**

**Activated Nexus Devices<sup>514</sup>**



<sup>509</sup> "Not just for phone nerds: Google calls Nexus 5 a sales winner," The Verge, January 30, 2014.

<sup>510</sup> GOOG-77-00053552 – 591 at 583.

<sup>511</sup> Key Call: Google Inc. – The Innovation Leader; UBS Securities LLC., p. 12.

<sup>512</sup> GOOG-01-00053555 – 575 at 562.

<sup>513</sup> GOOG-00132218 – 244 at 220.

<sup>514</sup> GOOG-00132218 – 244 at 225.





248. Given this and the other record evidence, it is my opinion that Google realized revenue from the sale of Android-related hardware that is attributable to the Infringed Java Copyrights.

### 11.1.3 Causal Nexus to Application and Content Revenue

#### *Application Revenue*

249. The three categories of Android applications discussed in the following sections include: 1) Android Specific Applications; 2) Google Applications; and 3) Third Party Apps available through Android Market/Google Play.

#### 11.1.3.1 Android Specific Applications



Figure 31

Android Specific Applications<sup>515</sup>

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#### 11.1.3.2 Google Applications



Figure 32

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<sup>515</sup> GOOGLE-03169550 - 603 at 599.

<sup>516</sup> GOOGLE-03169550 - 603 at 598.



### 11.1.3.3 Third Party Android Market/Google Play Apps

251. Google created a market for over-the-air downloads for free and premium third-party Apps. The market was originally referred to as Android Market, and is now known as Google Play. Through this market, Apps developed by registered developers may be downloaded to Android-powered devices. Third-party Android Market/Google Play applications are those applications distributed through Google Play in accordance with Developer Distribution Agreements, and made available to users of Android devices.<sup>517</sup>
252. Android Market/Google Play was launched in March of 2012, to create a more comprehensive source for music, movies, Apps, and e-books.<sup>518</sup> Google's 2013 Form 10-K states, "*Google Play is an entirely cloud-based, digital entertainment store with more than a million apps and games plus millions of songs and books and thousands of movies that our users can find, enjoy and share on their computer, phone or tablet.*"<sup>519</sup> In connection with the launch of Android Market, Google saw an increase in "Other Revenue" from 2012 to 2013 of \$2.6 billion, and stated "[t]he increase was primarily due to growth of our digital content products, such as apps, music, and movies."<sup>520</sup> From 2013 to 2014, Google's "Other Revenue" again increased by \$2.0 billion "*primarily due to growth of our sales of digital content products, such as apps, music, and movies on the Google Play store.*"<sup>521</sup>
253. According to a July 2015 Trefis analyst report:
- "The Google phone division makes up 10.5% of its estimated value. Considering the growth of Google's Android platform and the growth in smartphone adoption globally, Google's Play store is fast becoming a vital cog for Google's growth in the coming years. Google Play is also connecting developers and content providers with more than 1 billion people on Android devices around the world. Developers are building thriving businesses in this platform, and in February, Google announced that over the past 12 months (FY 2014), it paid more than \$7 billion to developers."*<sup>522</sup>
254. Apps play a major role in winning customer loyalty.<sup>523</sup> "Exclusivity of applications and the ability to build an extensive personal collection will drive customer loyalty to the device platform since repurchasing and/or porting apps and content collections to another OS will be perceived as time-consuming and expensive by users."<sup>524</sup> Further, a platform's App store "is tightly linked

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<sup>517</sup> GOOGLE-03169550 – 603 at 556.

<sup>518</sup> <http://www.cnet.com/news/google-reboots-android-market-launches-google-play/>.

<sup>519</sup> Google 2013 Form 10-K, p. 3.

<sup>520</sup> Google 2014 Form 10-K, p. 24.

<sup>521</sup> Google 2014 Form 10-K, p. 24.

<sup>522</sup> Trefis Analyst Report, "Google Earnings: Profits Soars as the Company Reins in Cost," July 17, 2015.

<sup>523</sup> Google Launches Android Market, [http://www.techhive.com/article/152613/google\\_android\\_ships.html](http://www.techhive.com/article/152613/google_android_ships.html).

<sup>524</sup> Do App Stores Impact Wireless Device Sales?, October 18, 2010, [https://www.strategyanalytics.com/strategy-analytics/blogs/media-services/media-services-ux/media-and-services-ux/2010/10/18/do-app-stores-impact-wireless-device-sales-#.Vh0dY\\_IVhBc](https://www.strategyanalytics.com/strategy-analytics/blogs/media-services/media-services-ux/media-and-services-ux/2010/10/18/do-app-stores-impact-wireless-device-sales-#.Vh0dY_IVhBc).



with the explosion of smartphone penetration and usage by consumers worldwide.”<sup>525</sup> For Google, this is key since having more users who have the exposure to, and ability to use their products, such as Google Search, generates more revenue for Google through their core business of advertising,<sup>526</sup> in addition to generating a portion of revenue from App sales.<sup>527</sup>

255. Android Market was a critical part of Google’s Android strategy at the time of launch.<sup>528</sup> However, in order for Android Market to be successful, and to compete with the iPhone App Store, Google believed it would need a “*strong network of partners distributing Market on devices*,” and would need to match the revenue sharing provided by Apple to developers of 70 percent of the revenues generated by their applications.<sup>529</sup> As mentioned previously, Android Market provided Google with the following benefits:

- It ensure[d] an open application ecosystem without the traditional barriers to entry or distribution, maximizing the return on investment for developers
- It is a carrot for handset manufacturers to be Android-compatible
- It helped ensure Google could get Apps out to mobile users<sup>530</sup>

256. In 2014, Google reported [REDACTED] in App Revenue generated through the Android platform, which is a [REDACTED] over 2013 App Revenue, and a [REDACTED] compound annual growth rate from 2009, when Google first began recording Android-related App Revenue.<sup>531</sup>

257. There have been more than 100 billion Apps downloaded for Android devices.<sup>532</sup> In Q2 2013 Google announced in its Earnings Call that “[m]ore than 50 billion apps have been downloaded so far.”<sup>533</sup> **Figure 33** reflects cumulative App downloads as of certain months from August 2010 to July 2013 which supports the representation made during the Q2 2013 Earnings Call concerning the 50 billion Apps that had been downloaded as of that time. Further in 2014, “Google saw over 50 billion installs.”<sup>534</sup>

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<sup>525</sup> The Rise of Mobile Application Stores *Gateways to the World of Apps*, Booz & Co., p. 2.

<sup>526</sup> Deposition of Andrew Rubin, August 18, 2011, pp. 74-76; 2013 Q1 Earnings Call (Google Play was “fundamental to the success of the Android ecosystem”), at p.2.

<sup>527</sup> Android Strategy and Partnerships Overview, June 2009, GOOGLE-22-00060007 – 044 at 030.

<sup>528</sup> Android Market Setup for Partner Rev-Share, PSO Android Team, GOOGLE-00302808 – 811 at 808.

<sup>529</sup> Android Market Setup for Partner Rev-Share, PSO Android Team, GOOGLE-00302808 – 811 at 808.

<sup>530</sup> Android Market Setup for Partner Rev-Share, PSO Android Team, GOOGLE-00302808 – 811 at 808.

<sup>531</sup> Exhibit 8.

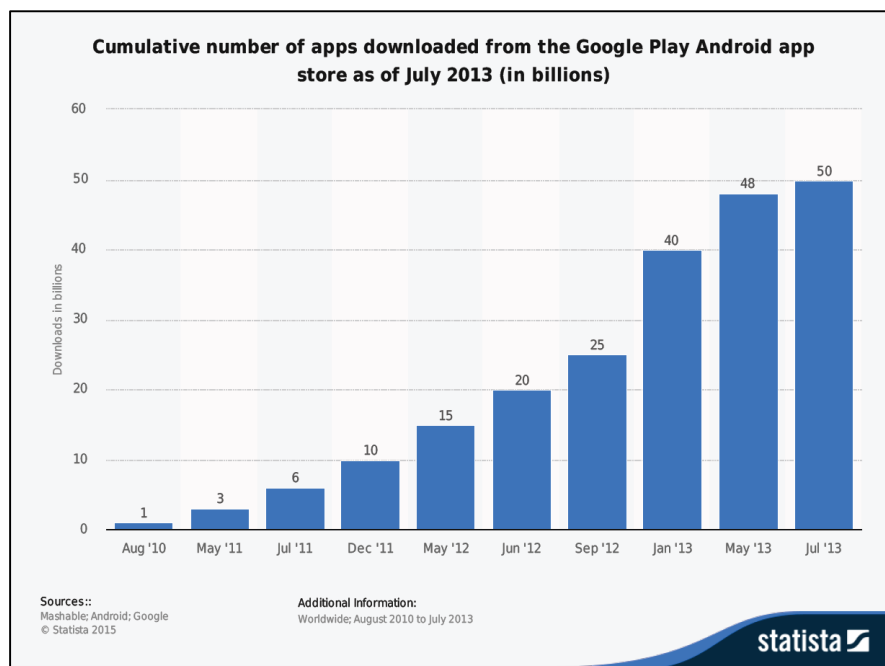
<sup>532</sup> <http://www.statista.com/statistics/281106/number-of-android-app-downloads-from-google-play>; Google Play sees more than 50 billion installs in the past year, over one billion active users, May 28, 2015, <http://www.androidcentral.com/google-play-sees-more-50-billion-installs-past-year-over-one-billion-active-users>.

<sup>533</sup> Google Inc (GOOG) CEO Discusses Q2 2013 Results – Earnings Call Transcript, July 18, 2013, <http://seekingalpha.com/article/1557292-google-inc-goog-ceo-discusses-q2-2013-resuts-earnings-call-transcript>.

<sup>534</sup> Google Play sees more than 50 billion installs in the past year, over one billion active users, May 28, 2015, <http://www.androidcentral.com/google-play-sees-more-50-billion-installs-past-year-over-one-billion-active-users>.



**Figure 33**  
**Cumulative Google Play Downloads<sup>535</sup>**



258. As reflected in the following Google business records, an Android business objective has clearly been the generation of revenue via the sale of Apps through Android Market/Google Play.

- **The Q1 2009 Android OC Report:** Within a few months of the first Android device sale, Google reported on its Android Market (Google Play) statistics. According to a Google business record, during the first quarter of 2009, Android Market was experiencing 2,000 Software Development Kit downloads per day. There were 11,000 developers with 2,700 Apps, and 43 million Apps had been downloaded with 85 percent of users downloading a minimum of one App.<sup>536</sup>
- **The Q4 2010 Android OC Report:** Two years after the first sale of an Android device, Google reported that 89,000 Apps were available for download from Android Market/Google Play, of which 33,000 were paid Apps.<sup>537</sup> As of October 2010, Google projected annual App Gross Revenue for both Android phones and tablets as reflected in **Figure 34** below.

<sup>535</sup> <http://www.statista.com/statistics/281106/number-of-android-app-downloads-from-google-play/>

<sup>536</sup> GOOGLE-00303725 – 756 at 745.

<sup>537</sup> GOOGLE-00395207 – 248 at 210.



**Figure 34**  
**Projected Annual App Revenue<sup>538</sup>**

| <u>Projected App Revenues</u> | <u>2010</u>   | <u>2011</u>    | <u>2012</u>    | <u>2013</u>      |
|-------------------------------|---------------|----------------|----------------|------------------|
| Gross Revenue - Phones        | \$50.6        | \$214.6        | \$638.3        | \$1,706.7        |
| Gross Revenue - Tablets       | 0.0           | 31.3           | 175.1          | 552.7            |
| <b>Total</b>                  | <b>\$50.6</b> | <b>\$245.9</b> | <b>\$813.4</b> | <b>\$2,259.4</b> |

This document asks the question: “If we gave it away, how can we ensure we get to benefit from it?” One of the responses to this question concerns the importance of Apps to Android, and states “[w]e created the first app store for Android and it got critical mass quickly. The store now has value and partners want access to it because of the number of apps available.”<sup>539</sup>

- **The Q1 2011 Android OC Report:** By March 2011, the number of free Apps in Android Market had increased to about 117,500, and the number of paid Apps in Android Market had increased to about 74,500.<sup>540</sup>
- **Google May 2015 Introduction to Android:** According to an Android Profit and Loss statement, App Revenue was \$1.4 billion in 2013, was ████████ in 2014, and was expected to be ████████ in 2015.<sup>541</sup>

259. Given this and the other record evidence in this case, it is my opinion that the revenue Google realized from the sale of Apps through Android Market/Google Play is attributable to the Infringed Java Copyrights.

### ***Digital Content Revenue***

260. Digital Content sold through the Google Play Store has included the aforementioned Apps, music and movies.<sup>542</sup> According to the Q4 2010 Android OC Report, the introduction through Google Play of “New Monetizable Services” such as downloadable Music and “Other Digital Content,” was part of Phase 3 (2011 to 2013) of the Android platform strategy.<sup>543</sup> Google projected that downloadable music alone would generate total gross revenue of \$1.5 – \$3.0 billion by 2013.<sup>544</sup> According to the May 2015 Introduction to Android presentation, Google

<sup>538</sup> GOOGLE-00395207 – 248 at 243.

<sup>539</sup> Google Android Operating Committee Quarterly Review – Q4 2010, GOOGLE-01-00053552 – 591 at 563.

<sup>540</sup> Google Android Operating Committee Quarterly Review – Q1 2011, GOOGLE-77-00053555 – 575 at 560.

<sup>541</sup> Google Introduction to Android May 2015; GOOG-00130338 – 386 at 339 and 342.

<sup>542</sup> Google 2014 Form 10-K, p. 24.

<sup>543</sup> GOOGLE-01-00053552 – 591 at 567.

<sup>544</sup> GOOGLE-01-00053552 – 591 at 569.



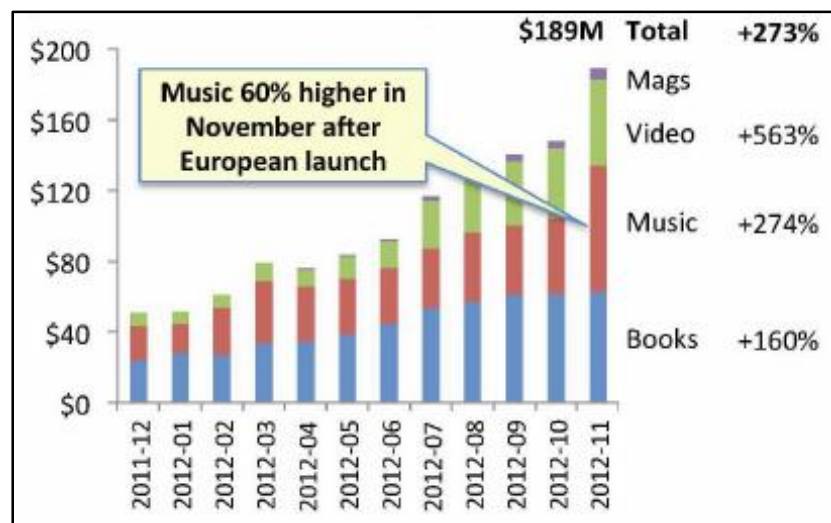
reported \$298 million of Digital Content Revenue in 2013, [REDACTED] of Digital Content Revenue in 2014, and [REDACTED] of planned Digital Content Revenue in 2015.<sup>545</sup>

261. As reflected in the following Google business records, one of Google's Android business objectives has been to generate revenue via the sale of Digital Content through Android Market/Google Play.

- **Mobile Update – 2012 Review:** According to Mr. Rubin's 2012 Review for Google's mobile business, Google Play experienced "[c]onstant growth driven by vertical and country expansion." **Figure 35** below illustrates annual run rates for Digital Content from December 2011 to November 2012 for books, music, videos, and magazines downloaded through the Google Play store.<sup>546</sup>

**Figure 35**

**Android Digital Content Revenues<sup>547</sup>**



- **May 2015 Introduction to Android Presentation:** According to a May 2015 Google internal presentation, more than 680 million unique users downloaded something from Google Play in the 30 day period ending May 26, 2015.<sup>548</sup>
- **April 2015 Forbes Article:** According to an April 2015 Forbes article, "[c]onsidering the growth of Google's Android platform and the growth in smartphones adoption across the globe, Google's Play store is fast becoming a vital cog for Google's growth in the coming years. . . . We

<sup>545</sup> GOOG-00130338 – 386 at 342.

<sup>546</sup> GOOG-00132218 – 244 at 223.

<sup>547</sup> GOOG-00132218 – 244 at 223.

<sup>548</sup> GOOG-00130338 – 386 at 346.



*believe that Google will be able to leverage popularity of Android platform to boost its revenues. Currently, we forecast digital content revenue to grow to \$8.51 billion by the end of our forecast period.”<sup>549</sup>*

262. Given this and the other record evidence in this case, it is my opinion that the revenue Google realized from the sale of Digital Content through Android Market/Google Play is attributable to the Infringed Java Copyrights.

#### 11.1.4 Causal Nexus to Advertising Revenues

263. Google realized Ad Revenues totaling \$29.0 billion from Android devices from 2008 through 2015.<sup>550</sup> From the outset, Google articulated that its purpose for building the Android platform and getting it to market when it did was to be able to achieve this market opportunity. As Mr. Schmidt testified “The vast majority of Google’s revenue at the time and today comes from search revenue. And so the primary reason to have something like Android is that people will do more searches, and then we’ll get more money as a result. And that’s how we, essentially, pay for the strategy of Android.”<sup>551</sup> According to an April 2015 Forbes article, Google’s mobile Ads division is the second largest division within Google, and makes up approximately 32 percent of Google’s total value.<sup>552</sup> **Figure 36** below illustrates the quarterly growth of worldwide Android-related Ad Revenue as reported by Google for the period January 1, 2012 through June 30, 2015. As **Figure 36** illustrates, Google reported Android Ad Revenue of less than \$500 million for Q1 2012. However, due to the substantial growth in the number of active Android users during this time period, by Q2 2015, Google’s quarterly Ad Revenue generated from Android devices increased to [REDACTED]

<sup>549</sup> “Google Earnings Preview: Will Advertising Revenue Grow?,” Forbes, April 22, 2015. <http://www.forbes.com/sites/greatspeculations/2015/04/22/google-earnings-preview-will-advertising-revenue-grow/>

<sup>550</sup> Exhibit 8.1.

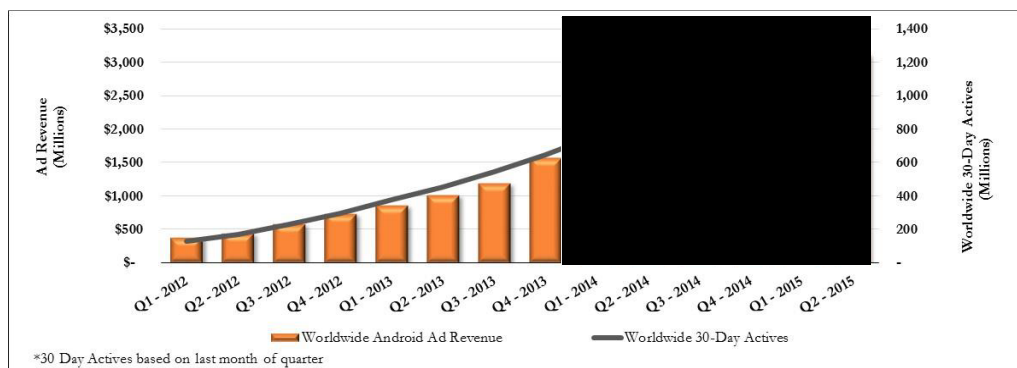
<sup>551</sup> Eric Schmidt Trial Testimony, April 24, 2013 at 1458.

<sup>552</sup> “Google Earnings Preview: Will Advertising Revenue Grow?,” Forbes, April 22, 2015. <http://www.forbes.com/sites/greatspeculations/2015/04/22/google-earnings-preview-will-advertising-revenue-grow/>





Figure 36

Quarterly Android Ad Revenue and Android 30-Day Actives<sup>553</sup>

264. In addition to the graphically represented information reflected in **Figure 36**, I have also performed a regression analysis of Android 30-Day Actives to Android Ad Revenue. The analysis resulted in an R- Squared value of 99.4 percent which suggests a strong relationship between Android 30-Day Actives (i.e. the number of people who had an Android phone in service in the last 30 days) and Android Ad Revenue. I believe that such a conclusion is consistent with the information reflected in **Figure 36**.
265. Google offers its advertising clients three advertising programs: AdWords, AdSense and Display. These programs are offered for Internet browsing performed from both desktop computers and mobile devices. The following subsections describe these advertising programs through which Google realized advertising revenues via Internet searches from Android devices.
- 11.1.4.1 Google AdWords**
266. According to Google's 2014 Form 10-K, AdWords is its primary auction-based advertising program for performance advertisers.<sup>554</sup> Google performance advertisers pay on a cost-per-engagement basis, as when a user engages in their ads.<sup>555</sup> AdWords "helps create simple text-based ads that appear on Google websites."<sup>556</sup>
267. Performance advertisers bid on certain keywords in order for their clickable ads to appear in Google's search engine results pages. Since performance advertisers pay "per-click," this is how Google makes money from its search function. Google's advertising clients have to bid against other marketers for how much they are willing to pay Google every time a user clicks on their

<sup>553</sup> GOOG-00022382 and GOOG-00022386.

<sup>554</sup> Google 2014 Form 10-K, p. 3.

<sup>555</sup> Google 2014 Form 10-K, p. 3.

<sup>556</sup> Google 2014 Form 10-K, p. 3.



ads. The more an advertiser is willing to pay, the more likely their ad will appear in the search results. [REDACTED].<sup>557</sup>

#### 11.1.4.2 Google AdSense

268. AdSense refers to the online programs through which Google distributes Ads on the websites of Google Network Members.<sup>558</sup> It is a performance-based advertising program which means that advertisers pay Google on a per-click basis. Performance advertisers bid for ad space on the websites of Google Network Members, and the highest bidders get to place ads on the Google Network Partners' websites.<sup>559</sup>
269. Google has several product offerings under the AdSense advertising program. AdSense for Content displays advertisements alongside the existing online content on the website. AdSense for Search<sup>560</sup> provides for a custom search engine on the publisher's website to provide users with search capabilities. Under this product offering, the publisher can specify what content users search for by filtering where results are fetched from: publisher's website only, a collection of publisher-approved sites, or the entire web.<sup>561</sup>

#### 11.1.4.3 Google Display

270. Google Display is Google's non-performance based advertising program through which advertisers pay Google on a cost-per-impression basis.<sup>562</sup> This enables Google brand advertisers to pay Google based on the number of times their ads display on Google websites and Google Network Members' websites as specified by the advertisers.<sup>563</sup>
271. Google's principal business objective with respect to Android has been the generation of mobile Ad Revenue. This is evidenced by Google's business records and deposition testimony, as well as statements by Google executives, court appointed experts, and third-party researchers. Examples of such evidence are provided in the sections that follow.

#### *Google Business Records*

- **July 2005 Tim Lindholm email regarding "Android notes"**: States that, with respect to Android, "Google's goal in this would be to create more mobile page views, from more compelling content, which will create more ad views. It's making a bigger, tastier pie."<sup>564</sup>

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<sup>557</sup> See Exhibit 8.1.

<sup>558</sup> Google 2014 Form 10-K, p. 49.

<sup>559</sup> <https://www.google.com/adsense/start/how-it-works.html>.

<sup>560</sup> Also referred to as "Google Custom Search."

<sup>561</sup> <https://support.google.com/adsense/answer/9879?hl=en&topic=1705820>.

<sup>562</sup> Deposition of Jonathan Gold, December 11, 2015, p. 93.

<sup>563</sup> Google 2014 Form 10-K, p. 49.

<sup>564</sup> GOOGLE-12-00000115.



- **August 2005 Alan Eustace Operating Plan:** States that, in 2005, Google was “facing a repeat in history, only the stakes are higher: In 2004 there were only 178M personal computers sold. During the same period, there were 657M handsets sold. The almost 4x market size is a huge motivator for OS companies like Symbian and Microsoft to enter the market. While most new handsets are capable of connecting to the Internet . . .”<sup>565</sup> “The Android solution ‘changes the game’ by offering each stakeholder a significant advantage in core areas of their business, while streamlining the delivery of enhanced services that are important to Google.”<sup>566</sup>
- **January 2006 Internal Google Correspondence:** Google internally discussed a possible co-development partnership with Sun under which Java technology would become an open-source part of the Android platform. The deal was projected to cost Google 25-50 million dollars, plus a negotiable share of revenue from “platform-enabled mobile ads.”<sup>567</sup>
- **Android Operating Committee Q1 2009 Quarterly Review (“the Q1 2009 Android OC Report”):** Indicates that “Search + Android = Huge.”<sup>568</sup> According to this report, “[n]early 100% of our users have searched in the last 30 days. . . . 70% of all searches are initiated from Android search framework, rather than Google.com website.”<sup>569</sup> According to the Q1 2009 Android OC Report, Search widget and browser search box drove 80 percent of Android revenue.<sup>570</sup>
- **Android Operating Committee Q4 2010 Quarterly Review (“the Q4 2010 Android OC Report”):** Identifies as a “Highlight” of the Android platform, a \$155 million per year run rate for Search and Ad Revenue.<sup>571</sup> According to the Q4 2010 Android OC Report, the Android platform experienced “[s]trong revenue growth due to increase in the number of Android devices . . . Android continues to be the #2 contributor to Google mobile ads revenues.”<sup>572</sup> Google forecasted Android Ad Revenue to be \$114.2 million in 2010. At that time, Google predicted the Android platform would be the “#1” contributor to Google mobile ad revenue by 2012.<sup>573</sup>

272. The Q4 2010 Android OC Report indicates that “Android created a hardware and services ecosystem worth over \$43B a year. . . . Our apps and ads services have made this [] possible, and

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<sup>565</sup> GOOG-00580946 – 991 at 961.

<sup>566</sup> GOOG-00580946 – 991 at 962.

<sup>567</sup> GOOGLE-14-00042244-254 at 248.

<sup>568</sup> Google Android Operating Committee Quarterly Review – Q1 2009, GOOGLE-00303725 – 756 at 731.

<sup>569</sup> Google Android Operating Committee Quarterly Review – Q1 2009, GOOGLE-00303725 – 756 at 731.

<sup>570</sup> Google Android Operating Committee Quarterly Review – Q1 2009, GOOGLE-00303725 – 756 at 739.

<sup>571</sup> Google Android Operating Committee Quarterly Review – Q4 2010, GOOGLE-01-00053552 – 591 at 555.

<sup>572</sup> Google Android Operating Committee Quarterly Review – Q4 2010, GOOGLE-01-00053552 – 591 at 556.

<sup>573</sup> Google Android Operating Committee Quarterly Review – Q4 2010, GOOGLE-01-00053552 – 591 at 556.



work to protect our position.”<sup>574</sup> At the time the Q4 2010 Android OC Report was prepared, Google considered the “Android Strategy” to be at the beginning of “Phase 2” – entitled “Extend Our Core Business.” According to this report, at this time, Google considered its “Core Business” to be Search, Ads and Apps.<sup>575</sup> Google forecasted that Android Ad Revenue would be realized through both smartphones and tablets in the total annual amounts reflected in **Figure 37** below.

**Figure 37**

**Forecasted Android Advertising Revenue as of October 2010 (*in millions*)**<sup>576</sup>

| <u>Projected Ad Revenue</u> | <u>2010</u>    | <u>2011</u>    | <u>2012</u>    | <u>2013</u>      |
|-----------------------------|----------------|----------------|----------------|------------------|
| Smartphones                 | \$115.0        | \$323.8        | \$541.6        | \$766.7          |
| Tablets                     | 0.0            | 94.3           | 297.1          | 496.6            |
| Total                       | <u>\$115.0</u> | <u>\$418.1</u> | <u>\$838.7</u> | <u>\$1,263.3</u> |

- **Android Operating Committee Q1 2011 Quarterly Review (“the Q1 2011 Android OC Report”)**: Lists as a “Highlight” the fact that Android Ad Revenue run-rate passed all other high-end phone platforms in the United States on January 25, 2011, and in Japan on March 30, 2011.<sup>577</sup> Google reported Android Ad Revenue of \$120.1 million in 2010, and forecasted annual Android Ad Revenue as reflected in **Figure 38** below.<sup>578</sup>

**Figure 38**

**Forecasted Android Advertising Revenue as of May 2011 (*in millions*)**<sup>579</sup>

|                      | <u>2010</u> | <u>2011</u> | <u>2012</u> | <u>2013</u> |
|----------------------|-------------|-------------|-------------|-------------|
| Projected Ad Revenue | -           | \$528.4     | \$1,083.8   | \$1,715.8   |

273. The Android Operating Committee in Quarterly Review reports comment as follows.

- **Android 2011 Actual Quarterly Profit and Loss Statements**: An internal Google Android 2011 Profit and Loss statement reports Ad Revenue of \$569.0 million, representing more than 90 percent of 2011 total Android-related revenues.<sup>580</sup>

<sup>574</sup> Google Android Operating Committee Quarterly Review – Q4 2010, GOOGLE-01-00053552 – 591 at 566.

<sup>575</sup> Google Android Operating Committee Quarterly Review – Q4 2010, GOOGLE-01-00053552 – 591 at 567.

<sup>576</sup> Google Android Operating Committee Quarterly Review – Q4 2010, GOOGLE-01-00053552 – 591 at 585.

<sup>577</sup> Google Android Operating Committee Quarterly Review – Q1 2011, GOOGLE-77-00053555 – 575 at 557.

<sup>578</sup> Google Android Operating Committee Quarterly Review – Q1 2011, GOOGLE-77-00053555 – 575 at 562.

<sup>579</sup> Google Android Operating Committee Quarterly Review – Q4 2010, GOOGLE-77-00053555 – 575 at 562.

<sup>580</sup> GOOG-00132625, Tabs “Final Legal” and “Final – Backup”; \$569 / (\$569 + \$51) = 91.8 percent.



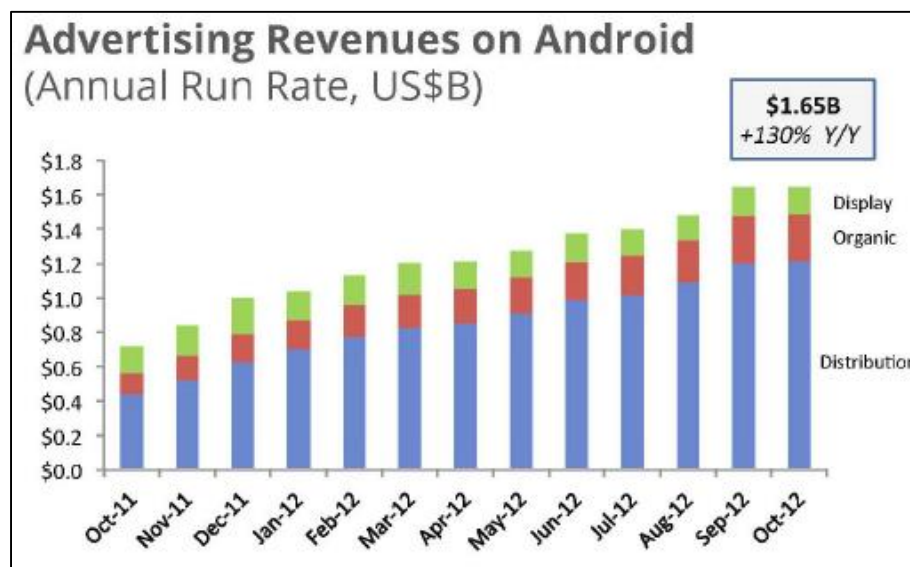
- **July 2011 Mobile Display Ads Manifesto:** According to Google, it was:

*sitting on one of the biggest commercial opportunities in the world. Smartphones and tablets already outsell \*all PCs\* (desktops, laptops, smartphones). Publishers and developers are moving en masse to phones and tablets, and ads will be one of the primary ways they will support their apps and content. Advertisers want to reach users wherever they are, and users are spending more and more time on tablets and phones. . . . We have the largest mobile ads network. We have the best ad buying and serving platforms with DFP, DFA, and AdX. As we know display better than anyone. We have Android. We have 2M advertisers, all of whom will be advertising on mobile in a few years. We have the best and biggest online ads sales force in the world.*<sup>581</sup>

- **Mobile Update – 2012 Review:** According to Mr. Rubin’s 2012 Review Report for Google’s mobile business, the continued growth of Search and Ad Revenue was “powered by distribution deals.”<sup>582</sup> **Figure 39** below illustrates annual run rates for Ad Revenues from Android devices from October 2011 to October 2012.<sup>583</sup>

**Figure 39**

**Monthly Android-Related Ad Revenues Oct. 2011 to Oct. 2012<sup>584</sup>**



<sup>581</sup> GOOG-00273854 – 874 at 873.

<sup>582</sup> GOOG-00132218 – 244 at 226.

<sup>583</sup> GOOG-00132218 – 244 at 226.

<sup>584</sup> GOOG-00132218 – 244 at 226.



- **2009 Android Strategy and Partnerships Overview:** According to a June 2009 Google internal presentation by Mr. Brady concerning Google’s Android strategy, Android’s strategic value to Google was summarized as “Don’t get locked out!”<sup>585</sup>

274. A slide entitled “Android platform and Monetization,” indicates that “Android drives revenue through search ads....We enable a full web browser which can render desktop web pages . . . which means we can serve desktop ads.”<sup>586</sup>

- [REDACTED]

[REDACTED]

- **Android Weekly Metrics Summary for March 31, 2013:** A Google report of the weekly operating and financial metrics for Android indicates that Search Revenue was considered part of the Android platform, and represented approximately [REDACTED] of the revenue run rate at that time.<sup>589</sup>

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<sup>585</sup> GOOG-00387553 – 591 at 562.

<sup>586</sup> GOOGLE-22-00060007 – 044 at 017.

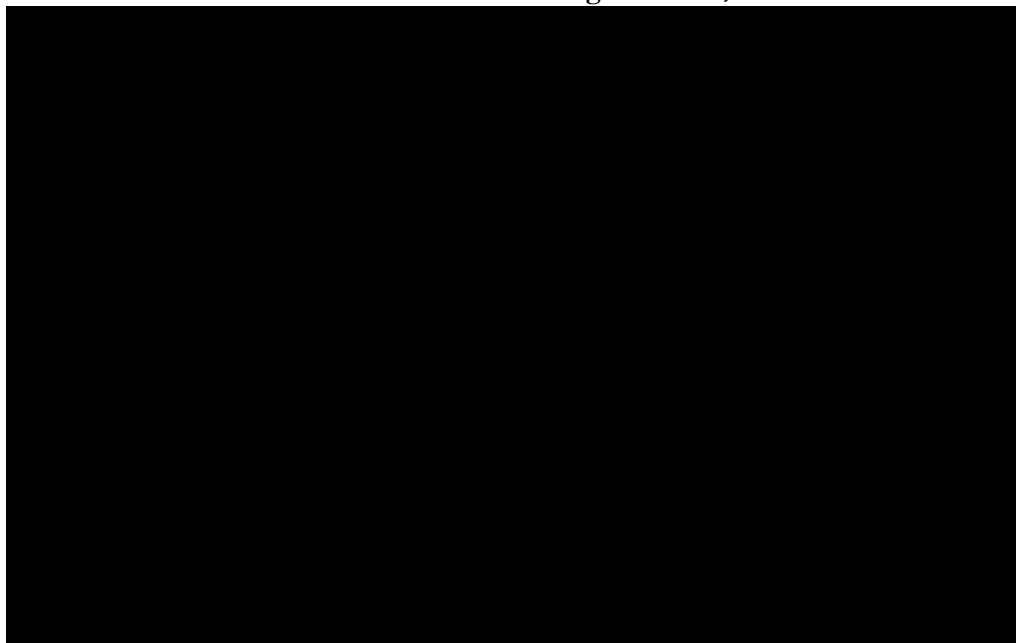
<sup>587</sup> GOOGLE-03169550 – 603 at 573 and 576.

<sup>588</sup> GOOGLE-03169550 – 603 at 576.

<sup>589</sup> GOOG-00290796 – 928 at 798.

Figure 40<sup>590</sup>

## Android Metrics – Week Ending March 31, 2013



- **November 2013 Value of Android User:** - Indicates that as of [REDACTED]  
[REDACTED]  
[REDACTED] The analysis also summarizes Google’s view of the drivers of Android users’ value, and includes Search Ads in that definition.<sup>592</sup>
- **January 2015 Android and Chrome Overview of Economics and Performance:**  
Provides an executive summary of key facts which indicates that “[i]n 2014, Google generated [REDACTED] channeled through Android devices.”<sup>593</sup>
- **May 2015 Introduction to Android:** According to a May 2015 Google internal presentation, “[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

<sup>590</sup> GOOG-00290796 – 928 at 798.<sup>591</sup> GOOG-00186877 – 891 at 879.<sup>592</sup> GOOG-00186877 – 891 at 880.<sup>593</sup> GOOG-00210248 – 270 at 249.<sup>594</sup> Google Introduction to Android May 2015; GOOG-00130338 – 386 at 339.



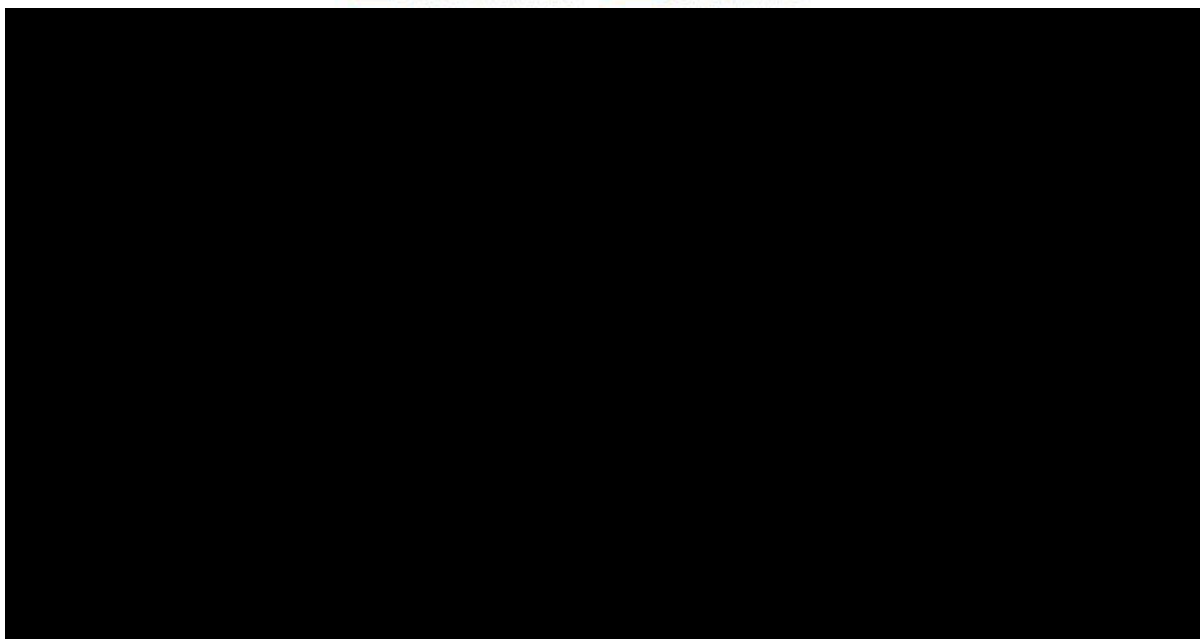


275. According to this May 2015 presentation, [REDACTED]

**Figure 41**

**Android Ad Revenue<sup>597</sup>**

Search Revenue Search ARPU



276. As **Figure 41** illustrates, monthly Android Ad Revenue<sup>598</sup> [REDACTED] in January 2014, [REDACTED] by April 2015.

***Testimony of Google Representatives and Witnesses***

277. The following testimony from Google representatives and witnesses illustrates that Google's principal business objective relating to Android has been the generation of mobile Ad Revenue.

*Q. What was Google's plan for generating profits from Open Source Android?*

<sup>595</sup> Google Introduction to Android May 2015; GOOG-00130338 – 386 at 343.

<sup>596</sup> Google Introduction to Android May 2015; GOOG-00130338 – 386 at 348.

<sup>597</sup> Google Introduction to Android May 2015; GOOG-00130338 – 386 at 348.

<sup>598</sup> Google uses the term "Search Revenue" interchangeably with "Ad Revenue" and "AdWords Revenue."



A. *[E]ssentially the message repeated frequently was that the more people use the internet, the more they do searches, and the more they do searches, the more likely they are to use Google to do so and therefore create revenue for Google through advertising.*

Q. *Okay. So Google expected to profit from Android by increasing the number of people who were doing searches on Google's search engine?*

A. *That is the stated – that's what we were told.*

Q. *Okay. And that increase in revenue would come from search advertising revenues. Is that what you were told?*

A. *That's what we were told.*<sup>599</sup>

...

Q. *Did you expect there would be any indirect benefits to Google from developing and Distributing the Android Platform?*

A. *To the extent that the users of that platform would also adopt Google search and advertising, yes, there would be monetary benefit to Google, if its advertising products are being used.*

Q. *Did you believe that users of the Android platform would adopt Google search and advertising?*

A. *Because of the goodwill being generated by having an open, free platform, as I said before, the carriers and OEMs, it would generate goodwill towards Google, and they would be more disposed to using Google's platform for search and advertising, yes.*<sup>600</sup>

...

Q. *Would it be accurate to say that the model Google has for Android is to make it available for free and to make money from advertising and the value-add services that go on top of the Android platform?*

A. *That's a component of our strategy, yes, and – yes.*<sup>601</sup>

...

Q. *With that modification, is that how – one of the ways in which Android generates revenue?*

A. *"... we generate revenue from ads shown on Google Search on Android devices. ... we make money off of ads on Google Search on an Android device. We make [money] off of ads revenues on Google Search on Android devices and from a very small share of money that we get from paid applications on Android Market."*<sup>602</sup>

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<sup>599</sup> Deposition of Daniel Morrill, July 12, 2011, p.73.

<sup>600</sup> Deposition of Dipchand Nishar, September 8, 2011, p. 96.

<sup>601</sup> Deposition of Eric Schmidt, August 23, 2011, p. 11.

<sup>602</sup> Deposition of Aditya Agarwal, April 8, 2011, pp. 24 – 27.



### ***Public Statements and Disclosures by Google Executives***

278. The following public statements by Google Executives also illustrate that Google's principal business objective with respect to Android has been the generation of mobile Ad Revenue.

- **Google Inc. Q2 2010 Earnings Call Transcript:** “[W]e gave some data just on the scope of the numbers, the 160,000 Android devices as well as the growth in apps from 30,000 to 70,000, but I think the most important most obvious thing to think about from our perspective is what’s the most popular app on these devices. The most popular app is a browser. And what do people do with the browser on these devices? They search an order of magnitude more than they have on any previous type of smartphones, which they had in years past. So, the combination of people browsing on these smartphones connected on very, very fast networks, and searching on them is basically the formula around how Google makes, how Google succeeds.”<sup>603</sup>
- **Google Inc. Q2 2011 Earnings Call Transcript:** “Continuing to talk about revenues, our mobile business continues to be another area of robust growth. The number which Larry just shared of 550,000 Android, that and the success of smartphones and general mobile data devices around the world is acting as an accelerator to our mobile advertising effort.”<sup>604</sup>
- **Google Inc. October 13, 2011 Earnings Call Transcript:** “Let’s turn to mobile advertising. Larry mentioned \$2.5 billion as a run rate. Our revenue growth continues to accelerate even in mobile, driven primarily by mobile search. This growth, obviously, is driven both by the underlying expansion of Android devices and of tablets as well as stellar performance by our sales teams by working closely with our customers to help them craft compelling mobile advertising solutions. Many advertisers have greatly increased the size and frequency of the mobile campaigns. Mobile is becoming a must-have.”<sup>605</sup>
- **Trial Testimony from the 2012 Proceedings:** During the 2012 trial in this matter, Mr. Schmidt stated that, with respect to Android, “[t]he vast majority of Google’s revenue at the time and today comes from search revenue. And so the primary reason to have something like Android is that people will do more searches, and then we’ll get more money as a result. And that’s how we, essentially, pay for the strategy of Android.”<sup>606</sup>

### ***Statements by Independent Third Party Research Firms***

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<sup>603</sup> Google Inc. Q2 2010 Earnings Call Transcript, <http://seekingalpha.com/article/214786-google-inc-q2-2010-earnings-call-transcript>, pp. 7 - 8.

<sup>604</sup> Google Inc. Q2 2011 Earnings Call Transcript, <http://www.morningstar.com/earnings/PrintTranscript.aspx?id=28170009>, p. 6.

<sup>605</sup> Google Management Discusses Q3 2011 Results – Earnings Call Transcript, October 13, 2011, <http://www.morningstar.com/earnings/PrintTranscript.aspx?id=31456567>, p. 6.

<sup>606</sup> *Oracle America, Inc. v. Google Inc.*, No. C. 10-3561, April 24, 2012, p. 1458.



279. Statements by independent third-party research firms likewise substantiate the connection between Android and Ad Revenue.
- According to a 2011 Piper Jaffray analyst report, Google was expected to generate advertising revenue of \$7.80 per Android user in 2011 and \$9.85 per user in 2012.<sup>607</sup> *“As consumer time spent on mobile devices continues to increase, we expect the ARPU’s on mobile could eventually reach those of Google’s online businesses.”*<sup>608</sup>
  - According to a Forbes article dated April 2015, *“[t]he mobile search ads division is the second largest division for Google and makes up approximately 32% of its total value, according to our model. Google, with 90% market share, dominates the mobile search engine market. One of the key reasons for this dominance is its flagship Android OS, which has witnessed excellent adoption and penetration in the smartphone space.”*<sup>609</sup>

***Statements by District Court and Court Appointed Expert***

280. Perhaps in recognition of the evidence of the connection between the infringement of the Java Copyrights and Google’s Android-related Ad Revenues, the District Court has stated that *“Google receives revenue through advertisement whenever a consumer uses particular functions on an Android smartphone.”*<sup>610</sup> The District Court has also indicated that:
- *“The accused product is Android, but unlike a typical infringing product, Android is not sold [by Google]. Instead, Google profits from Android indirectly. Any valuation of Android must take this business model into account. Put differently, the question is ‘what is the market value of Android. – what could it be bought or sold for – and to what extent do the infringing features contribute to that overall value?’”*<sup>611</sup>
  - *“Google is incorrect in asserting that the overall value of Android is irrelevant and is further incorrect in asserting that advertising revenues have nothing to do with the overall value. Of course they do have something to do with the overall value. There is evidence, for example, that users with Android phones ‘search twice as much’ as users with other types of phones, increasing the advertising revenue derived from Google’s search service.”*<sup>612</sup>

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<sup>607</sup> Piper Jaffray Report, “Android likely a \$1 Billion Business Next Year for Google,” February 8, 2011, p. 2.

<sup>608</sup> Piper Jaffray Report, “Android likely a \$1 Billion Business Next Year for Google,” February 8, 2011.

<sup>609</sup> “Google Earnings Preview: Will Advertising Revenue Grow?,” Forbes, April 22, 2015. <http://www.forbes.com/sites/greatspeculations/2015/04/22/google-earnings-preview-will-advertising-revenue-grow/>.

<sup>610</sup> *Oracle America, Inc. v. Google Inc.*, 872 F.Supp.2d 974, 978 (N.D.Cal. 2012).

<sup>611</sup> Trial Testimony of Eric Schmidt, Transcript Vol. 07, April 24, 2012, p. 1456; Order Granting in Part Motion to Strike Damage Report of Plaintiff Expert Iain Cockburn, July 22, 2011, p. 9.

<sup>612</sup> Deposition of Eric Schmidt, August 23, 2011, pp. 15-16; Order Granting in Part Motion to Strike Damage Report of Plaintiff Expert Iain Cockburn, July 22, 2011, p. 9.



- *“Additionally, for searches on Android devices, Google must share its revenue only with the device operator and not with any other intermediary. The relationship between Android and Google’s advertising revenues would have been known to the parties at the time of the hypothetical negotiation. Plaintiff may base its damages model on then-expected advertising revenue so long as apportionment is done.”*<sup>613</sup>
- *“In January 2006, Google internally discussed a possible co-development partnership deal under which Java technology would become an open-source part of the Android platform. The deal was projected to cost Google 25-50 million dollars, plus a negotiable share of revenue from ‘platform-enabled mobile ads.’ The record, however, contains no evidence that Google actually proposed this idea to Sun.”*<sup>614</sup>
- *“The following month, Sun supposedly ‘proposed [to Google] a deal that would include both a payment of \$20 million per year for three years plus 10 percent of the revenue generated by Google on handsets running the open source platform, capped at \$25 million’ per year.”*<sup>615</sup>

281. Given this and the other record evidence in this case, it is my opinion that Google realized Ad Revenue from the use of its services conducted from Android devices that is attributable to the Infringed Java Copyrights.

#### 11.1.5 Google’s Uses of Per Device Metrics to Measure its Monetization Strategy

282. The causal nexus between Android and the revenues identified above is supported by Google’s own analysis of the per device metrics it uses to measure its monetization strategy. Google’s documents explicitly indicate that the lifetime value of an Android user can be measured by the revenues derived from the Search Ad, Google Play (content and apps) and Brand Ads like YouTube and Display. In one such document, the lifetime margin impact of an Android user was determined to be [REDACTED].<sup>616</sup>

#### 11.1.6 Unclaimed Benefits Attributable to the Infringed Java Copyrights

283. It should also be noted that my calculation of Google’s profits is conservative in that it does not reflect profits enjoyed by Google outside of its Android business that also stem from its improper use of the Infringed Java Copyrights. Such benefits include, but are not necessarily limited to, enhancements in Google’s brand-value, in non-mobile search business. I note that Google recognized that Android’s success was an opportunity to “overcome our

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<sup>613</sup> Order Granting in Part Motion to Strike Damage Report of Plaintiff Expert Iain Cockburn, July 22, 2011, pp. 9-10; Deposition of Eric Schmidt, August 23, 2011, pp. 15-16.

<sup>614</sup> GOOGLE-14-00042244-254 at 248; Order Granting in Part Motion to Strike Damage Report of Plaintiff Expert Iain Cockburn, July 22, 2011, p. 3.

<sup>615</sup> OAGOOOGLE-0000357494; Order Granting in Part Motion to Strike Damage Report of Plaintiff Expert Iain Cockburn, July 22, 2011, p. 3.

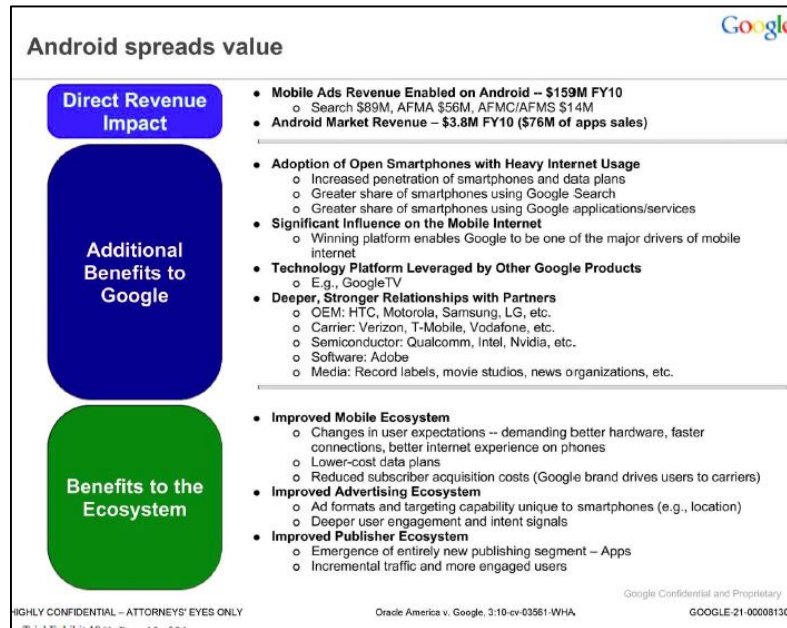
<sup>616</sup> GOOG-00130338 – 386 at 343.



shortcomings.”<sup>617</sup> I also note that, as seen in the **Figure 42**, Google’s own internal documents state that Android spreads value by providing “Additional Benefits to Google.”

**Figure 42**

**Google Internal Presentation<sup>618</sup>**



## 11.2 Quantification of Android-Related Revenues

284. In the following section, I address the quantification of the identified revenues Google realized from the Android platform. I would note that it could also be reasonable to claim additional sources of revenue and value to Google beyond those identified. For example, the value of Android to the overall Google brand has been significant.<sup>619</sup> A 2014 document entitled Google Android Retail and Play indicates that [REDACTED]

[REDACTED]<sup>620</sup>

285. Additionally, according to Mr. Schmidt, the Android platform has covered up for other Google shortcomings.<sup>621</sup> Therefore, I believe my opinion regarding Google’s profits is conservative in

<sup>617</sup> GOOGLE-26-00031558 – 559 at 559.

<sup>618</sup> Trial Exhibit 1061 – GOOGLE-21-00008116-139 at 130.

<sup>619</sup> Google ‘Opens’ a New Front in the Mobile Platform Wars, *Frost & Sullivan Market Insight*, October 23, 2008.

<sup>620</sup> GOOG-00100278 – 301 at 280.

<sup>621</sup> GOOGLE-26-00031558-559 at 559.



that it does not reflect any of those additional components of value, beyond those specifically related to the Android platform.<sup>622</sup>

### 11.2.1 Hardware

286. Google began selling Nexus devices in 2010. As reflected in **Figure 43**, from 2010 to 2015, annual revenue from sales of Nexus phones, tablets, watches and accessories<sup>623</sup> [REDACTED]

**Figure 43**

#### **Android Hardware Revenue<sup>624</sup>**

| <i>(in millions)</i> | 2008  | 2009  | 2010    | 2011  | 2012    | 2013    | 2014       | 2015 [1]   | Total     |
|----------------------|-------|-------|---------|-------|---------|---------|------------|------------|-----------|
| Hardware             | \$0.0 | \$0.0 | \$115.2 | \$0.0 | \$303.5 | \$834.7 | [REDACTED] | [REDACTED] | \$1,980.4 |

[1] Q4 2015 is a Google forecast.

287. All amounts received from sales of Nexus devices are recorded as Hardware Revenue. All costs associated with these devices are recorded to Cost of Sales.

### 11.2.2 Android Applications

288. Google began selling Apps through Android Market/Google Play in 2009. As reflected in **Figure 44**, Google's 30 percent share<sup>625</sup> of revenue from sales of paid for Apps downloaded from Android Market/Google Play increased from \$1.1 million in 2009 to an annualized total of [REDACTED] as of 2015. As **Figure 44** illustrates, Google achieved App sales of [REDACTED] from 2009 to 2015.

<sup>622</sup> GOOG-00275390 – 410, at 395

<sup>623</sup> Deposition of Jonathan Gold, December 11, 2015, p. 70.

<sup>624</sup> See Exhibit 8.

<sup>625</sup> Google shares App Revenue with App developers. Deposition of Jonathan Gold, December 11, 2015, p. 73.





Figure 44

Android App Revenue<sup>626</sup>

| <i>(in millions)</i> | 2008  | 2009  | 2010  | 2011   | 2012    | 2013      | 2014         | 2015 [1]     | Total     |
|----------------------|-------|-------|-------|--------|---------|-----------|--------------|--------------|-----------|
| App Sales            | \$0.0 | \$1.1 | \$8.0 | \$36.2 | \$136.1 | \$1,435.5 | \$[REDACTED] | \$[REDACTED] | \$7,972.2 |

[1] Q4 2015 is a Google forecast.

289. According to Mr. Gold, Google's reported Android App Revenue reflects only its 30 percent share of the revenue split with developers of Apps sold through Android Market/Google Play. Prior to 2012, Google's reported Android App Revenue represented Google's 30 percent developer revenue split less amounts Google paid to its carrier Distribution Partners.<sup>627</sup> Since 2012, Google's reported Android App Revenue has been reported as Google's entire 30 percent revenue split, and amounts paid to carriers are recorded to Cost of Sales.

## 11.2.3 Digital Content

290. Google began selling music, movies and other Digital Content through Android Market/Google Play in 2011. As reflected in **Figure 45** annual revenue from sales of Digital Content increased from \$14.8 million in 2011 to an annualized total of [REDACTED] in 2015. As **Figure 45** illustrates, Google recorded revenue from sales of Digital Content of [REDACTED] from 2011 to 2015.

Figure 45

Android Digital Content Revenue<sup>628</sup>

| <i>(in millions)</i> | 2008  | 2009  | 2010  | 2011   | 2012    | 2013    | 2014         | 2015 [1]     | Total     |
|----------------------|-------|-------|-------|--------|---------|---------|--------------|--------------|-----------|
| Digital Content      | \$0.0 | \$0.0 | \$0.0 | \$14.8 | \$105.8 | \$297.5 | \$[REDACTED] | \$[REDACTED] | \$1,656.7 |

[1] Q4 2015 is a Google forecast.

291. According to Mr. Gold, Digital Content Revenues reflects 100 percent of the amounts paid to download Digital Content through Android Market/Google Play. According to Mr. Gold, all costs associated with payments to content creators/owners and Google Distribution Partners are recorded to Cost of Sales.<sup>629</sup>

<sup>626</sup> See Exhibit 8.

<sup>627</sup> Deposition of Jonathan Gold, December 11, 2015, p. 73.

<sup>628</sup> See Exhibit 8.

<sup>629</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 38–39, 69–70, 72.



#### 11.2.4 Android Ad Revenue

292. As illustrated in **Exhibit 8.1** and summarized in **Figure 46**, Google earned Ad Revenue from Internet searches conducted from Android devices in the total amount of \$29.0 billion during the period 2008 through 2015.

**Figure 46**

**Google Annual Ad Revenue from Android Devices<sup>630</sup>**

| <i>(in millions)</i>  | 2008         | 2009          | 2010           | 2011           | 2012             | 2013             | 2014 | 2015 [1] | Total             |
|-----------------------|--------------|---------------|----------------|----------------|------------------|------------------|------|----------|-------------------|
| Android Ad Revenue    | \$0.7        | \$15.7        | \$120.1        | \$569.4        | -                | -                |      |          | \$705.9           |
| Search (AdWord)       | -            | -             | -              | -              | 1,444.9          | 3,021.7          |      |          | 18,862.2          |
| AdSense               | -            | -             | -              | -              | 238.6            | 424.9            |      |          | 2,001.0           |
| Display               | -            | -             | -              | -              | 468.9            | 1,212.9          |      |          | 7,388.0           |
| Total Android Ad Rev. | <u>\$0.7</u> | <u>\$15.7</u> | <u>\$120.1</u> | <u>\$569.4</u> | <u>\$2,152.4</u> | <u>\$4,659.5</u> |      |          | <u>\$28,957.1</u> |

[1] Annualized based on six-month period ending June 30th.

293. As **Figure 46** illustrates, the Ad Revenue Google realized from Internet searches from Android devices grew from \$0.7 million in 2008, to an annualized total of [REDACTED] in 2015. Consistent with Google's overall business, [REDACTED].

#### 11.2.5 Total

294. **Figure 47** is a summary of the revenue Google reported from the Android platform. As **Figure 47** illustrates, Google reported total revenue of \$40.6 billion from 2008 to 2015 from the Android platform.

**Figure 47**

**Summary of Annual Android Revenue<sup>631</sup>**

| <i>(in millions)</i> | 2008         | 2009          | 2010           | 2011           | 2012             | 2013             | 2014 | 2015 [1] | Total             |
|----------------------|--------------|---------------|----------------|----------------|------------------|------------------|------|----------|-------------------|
| Ad Revenue           | \$0.7        | \$15.7        | \$120.1        | \$569.4        | \$2,152.4        | \$4,659.5        |      |          | \$28,957.1        |
| Apps [2]             | 0.0          | 1.1           | 8.0            | 36.2           | 136.1            | 1,435.5          |      |          | 7,972.2           |
| Digital Content [2]  | 0.0          | 0.0           | 0.0            | 14.8           | 105.8            | 297.5            |      |          | 1,656.7           |
| Hardware [2]         | 0.0          | 0.0           | 115.2          | 0.0            | 303.5            | 834.7            |      |          | 1,980.4           |
| Gross Revenue        | <u>\$0.7</u> | <u>\$16.8</u> | <u>\$243.3</u> | <u>\$620.4</u> | <u>\$2,697.8</u> | <u>\$7,227.2</u> |      |          | <u>\$40,566.4</u> |

[1] Ad Revenues annualized based on six-month period ending June 30th.  
[2] Q4 2015 revenue is a Google forecast.

<sup>630</sup> In millions. See Exhibit 8.1.

<sup>631</sup> See Exhibit 8.



### 11.3 Quantification of Infringement-Related Costs and Expenses

#### 11.3.1 Android-Related Cost of Sales

295. During the relevant time period, Google regularly reported the profits it earned from the Android Platform to its Android Operating Committee, as well as to other Google executives. The profit and loss statements contained within contemporaneously-prepared business records, in addition to other data, provide a basis for quantifying the costs and expenses that actually helped generate the revenues I have determined are causally connected to the Infringed Java Copyrights.<sup>632</sup> **Exhibit 7** is a summary of Android-related annual operating results as reported by Google.

296. According to Mr. Aditya Agarwal, Senior Financial Analyst for Android:

*“Generally speaking, if an expense can be directly attributed to our product area and is coded to, let’s say, to an Android specific cost center or any Android specific unique identifier, that gets allocated to the product – to the Android product P&L. Any expense that’s—that’s something that is shared across different teams and cannot be – cannot be coded as something dedicated directly to Android, those don’t go in any – any product-specific P&Ls.”<sup>633</sup>*

##### 11.3.1.1 Google’s Overall Annual Reported Total Traffic Acquisition Costs (TAC)

297. Google Traffic Acquisition Costs represent fees paid to both Google Network Members for permitting ads to be placed on their websites, and Google Distribution Partners for directing Internet traffic on their networks or devices to Google websites. Google’s SEC filings disclose the annual amounts Google pays to both Network Members and Distribution Partners. **Figure 48** below is a summary of Google’s TAC as reported by Google in its Forms 10-K for the years 2011 to 2014.

**Figure 48**  
**Google Reported TAC<sup>634</sup>**

| Traffic Acquisition Costs | 2011           | 2012            | 2013            | 2014            |
|---------------------------|----------------|-----------------|-----------------|-----------------|
| Network Members           | \$7,294        | \$8,791         | \$9,293         | \$9,864         |
| Distribution Partners     | 1,517          | 2,165           | 2,965           | 3,633           |
| Total                     | <u>\$8,811</u> | <u>\$10,956</u> | <u>\$12,258</u> | <u>\$13,497</u> |

<sup>632</sup> Order Re Willfulness and Bifurcation, *Oracle America Inc. v. Google Inc.*, No. C 10-03561, September 18, 2015, p. 6.

<sup>633</sup> Deposition of Aditya Agarwal, May 10, 2012, p. 175.

<sup>634</sup> Google 2013 Form 10-K, p. 61; Google 2014 Form 10-K, p. 52.



### 11.3.1.2 Android-Related TAC Paid to Google Network Members

298. The “Traffic Acquisition Costs” line item reflected in **Exhibit 7** represents only estimated amounts Google paid to its Network Members to permit advertisements to be placed on their websites.<sup>635</sup> For the years 2008 to 2010, these amounts were reported by Google in the Q1 2009 OC Review, the Q4 2010 OC Review, and the Q1 2011 OC Review Reports to Google’s Android Operating Committee.
299. The Android-related financial data recently produced by Google for the years 2011 to 2015<sup>636</sup> do not include the TAC Google paid to its Network Members for Ad Revenue realized from Android devices. In order to estimate these costs for the years 2011 to 2014, I applied Google’s total annual Network Member TAC as percentages of Google’s total annual Ad Revenue to Google reported annual Android Ad Revenue. **Exhibit 7.1** is a summary of these annual calculations. For the year 2015, I applied the percentage of Android TAC provided by Mr. Gold during his deposition. According to Mr. Gold, Android TAC as a percentage of Android Ad Revenue is about 15 percent.<sup>637</sup>
300. As reflected in **Exhibit 7**, I have subtracted from total Android-related revenue an estimated \$4.8 billion for TAC paid by Google to its Network Members during the period 2008 through 2015.

### 11.3.1.3 Apps

301. According to a December 2013 Evercore analyst report, “Google Play gives Google control over Android-based commerce, charging a 30% cut with the remainder going to the publisher. While the 30% cut largely resides currently with Android OEM and carrier partners, we see this trend beginning to move in Google’s favor as strong overall Play traction continues.”<sup>638</sup>
302. Because Google recognizes only its 30 percent revenue split with App developers, App-related Cost of Sales does not include amounts paid to App developers. Instead, App-related Cost of Sales is comprised of amounts Google pays to carrier Distribution Partners as incentives to promote and support Android devices.<sup>639</sup> Google also records carrier Distribution Partner payments to Digital Content Cost of Sales.<sup>640</sup>
303. **Figure 21** above reflects the annual Android-related TAC paid to 14 carrier Distribution Partners in the four Google geographies of: 1) Americas, 2) Japan, 3) Korea and 4) Europe,

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<sup>635</sup> TAC paid by Google to Distribution Partners relating to the Android platform are addressed below.

<sup>636</sup> For example, GOOG-00022386 and GOOG-00103813.

<sup>637</sup> Deposition of Jonathan Gold, December 11, 2015, p. 189.

<sup>638</sup> Evercore Equity Research, Google Inc., December 13, 2013, p. 1.

<sup>639</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 71 – 72 and 185; Deposition of Aditya Agarwal, April 8, 2011, pp. 56 – 57; Deposition of Reto Meier, December 11, 2015, pp. 93-94.

<sup>640</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 71 – 72.



Middle East and Africa.<sup>641</sup> **Figure 21** is from a presentation prepared by Mr. Gold, Google's Finance Director, in May 2015.<sup>642</sup> According to this presentation, Google paid its carrier Distribution Partners a total of [REDACTED] in 2013, and about [REDACTED] in 2014.<sup>643</sup> These annual totals are less than the total Cost of Sales reported for both Apps and Digital Content in 2013 and 2014, as summarized by **Exhibit 7**. Thus, I have concluded that the annual amounts reported by Google as App and Digital Content Cost of Sales captures all of the Android-related TAC paid by Google to its carrier Distribution Partners.

304. I would note that, notwithstanding the language of any co-Development Device Strategic Marketing Agreement between Google and a carrier Distribution Partner,<sup>644</sup> the amounts recorded to Apps and Digital Content Cost of Sales for Google payments to carrier Distribution Partners are more broadly related to the adoption of the Android platform and distribution of Android devices. These payments do not relate, for example, to a cost incurred by Google to create an App or the Digital Content sold through Android Market/Google Play. Therefore, a portion of the TACs recorded to Apps and Digital Content Cost of Sales could properly be allocated to other Android-related revenue such as Android Ads, or alternatively, to Android-related advertising or promotional expense.
305. As **Exhibit 7** illustrates, Google reported about \$2.9 billion of App-related Cost of Sales during the years 2008 to 2015.

#### 11.3.1.4 Digital Content

306. According to Mr. Gold, Google reports 100 percent of its revenues from the sale of Digital Content through Android Market/Google Play. According to Mr. Gold, all costs associated with payments to content owners are recorded to Cost of Sales.<sup>645</sup> In addition, amounts paid to Google Distribution Partners (OEMs and carriers) are likewise reflected in Digital Content Cost of Sales.
307. As **Exhibit 7** illustrates, Google reported Digital Content Cost of Sales in the total amount of \$1.9 billion during the five-year period 2011 to 2015. As indicated in **Exhibit 7**, Google reported Digital Content Cost of Sales exceeded Digital Content Revenues in every year from 2011 to 2015. As indicated above, the portion of the Cost of Sales representing TAC payments to carrier Distribution Partners could properly be allocated to other Android-related revenue such as Android Ads, or alternatively, to Android-related advertising or promotional expense.

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<sup>641</sup> GOOG-00130338-386 at 362.

<sup>642</sup> GOOG-00130338-386 at 338 and 362; Deposition of Jonathan Gold, December 11, 2015, p. 177.

<sup>643</sup> \$352 + \$246 + \$237 + \$52 = \$887 and \$558 + \$302 + \$344 + \$67 = \$1,271. GOOG-00130338-386 at 362.

<sup>644</sup> See, for example, the 2009 Verizon Agreement, GOOGLE-03169550-603.

<sup>645</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 71 – 73.



### 11.3.1.5 Hardware

308. According to Mr. Gold, included within Hardware revenue are smartphones, tablets, watches, and a few other things such as accessories.<sup>646</sup> Hardware-related Cost of Sales represents amounts paid to third-party OEMs for the cost to manufacture these Android devices.

### 11.3.1.6 Infrastructure and Other Cost of Sales

309. According to Mr. Gold, Infrastructure and Other Cost of Sales includes the cost of items used by Google in the manufacturing and shipping of Android-related products and services, including such things as Google laptop computers for employees associated with customer support and “payment processing.”<sup>647</sup>

## 11.3.2 Quantification of Related Operating Expenses

310. The Android Profit and Loss Statements presented to the Android Operating Committee and other Google executives include the Operating Expenses Google incurred in connection with the development, promotion and administration of the Android platform. The Operating Expenses incurred in connection with Android are set forth in the following subsections.

### 11.3.2.1 Engineering

311. According to Mr. Gold, Engineering expense includes the salaries and bonuses of software engineers “with a handful of other one-off expenses” such as contract employee compensation, engineering-related equipment, and licensing related expenses.<sup>648</sup> The software engineers are associated with either Android or Google Play.<sup>649</sup> According to Mr. Gold, these software engineers are not the third-party developers that create the Apps that are offered through Google Play.<sup>650</sup>

### 11.3.2.2 Product Management

312. According to Mr. Gold, Product Engineering Management is “mostly employee salaries and bonuses” for software engineers.<sup>651</sup>

### 11.3.2.3 Sales and Marketing

313. Sales and Marketing expense is comprised of the salaries and other compensation paid to sales and business development people involved in Android-related activities.<sup>652</sup> This line item also

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<sup>646</sup> Deposition of Jonathan Gold, December 11, 2015, p. 70.

<sup>647</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 107 – 108, 126.

<sup>648</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 44 - 45.

<sup>649</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 81 – 82.

<sup>650</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 78 – 79.

<sup>651</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 78 – 79.

<sup>652</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 42 – 43.



includes the cost of advertising campaigns undertaken by third-parties for Android as well as the cost of third-party industry reports.

#### 11.3.2.4 Legal

314. Legal expense includes the fees paid to Google's outside legal counsel, as well as amounts paid by Google to settle lawsuits.<sup>653</sup> According to Mr. Gold, this line item also includes costs associated with in-house counsel.<sup>654</sup>

### 11.4 Summary of Profits Attributable to the Infringement

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315. **Exhibit 7** is a summary of the annual profits Google reported to the Android Operating Committee and other Google executives as related to the Android platform for the eight-year period 2008 to 2015.<sup>655</sup> As **Exhibit 7** illustrates, Google generated Android-related profits of \$21.3 billion during this time period.

### 11.5 Evidence Supporting the Profitability of Android

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316. Google's business records and other publicly available information confirm the fact that Android has been a highly profitable business endeavor for Google. The following is a summary of certain evidence of the profits Google realized from Android.

#### *Deposition Testimony*

- **Testimony of Aditya Agarwal:** According to Mr. Agarwal, then a Senior Financial Analyst at Google,

*Q. Would you agree with the statement that Android is hugely profitable?*

*A. Yes.*<sup>656</sup>

#### *Earnings Calls*

- **Google Q3 2010 Earnings call – Mr. Schmidt:** "...Android, which is well past anything that I had ever hoped for and looks like it's on its way to be a huge, huge success within our devices, devices, open model for access, lots and lots of innovation, more dynamic, more competition than any other part of the platform."<sup>657</sup>

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<sup>653</sup> Deposition of Jonathan Gold, December 11, 2015, p. 80.

<sup>654</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 80 - 81.

<sup>655</sup> Android devices were first sold in November 2008. 2015 data is annualized based on the six-month period ending June 30, 2015 for Ad revenue. App revenues, Digital Content revenues, and Hardware revenues are Google forecasts for Q4 2015.

<sup>656</sup> Deposition of Aditya Agarwal, April 8, 2011, p. 112.

<sup>657</sup> Google Inc. Q3 2010 Earnings Call Transcript, <http://www.morningstar.com/earnings/printtranscript.aspx?id=18282869>





- **Google Q3 2010 Earnings call – Mr. Schmidt:** “People say, well how do you make money from that? Well, let’s start with the fact that the evidence we have is that people who use Android search twice as much as everything else. So, clearly, there is more revenue associated with those searches. And another thing of course is if they are using Android systems, revenue that we share in the search as we shared with operator but not with anybody else. So, again it’s more lucrative. So, not only there are more searches and there is more apps, but it’s also more lucrative.”<sup>658</sup>
- **Google Q3 2010 Earnings call – Mr. Schmidt:** “Android is hugely profitable and we maintain the anti-segmentation and other things by a series of contracts around the store and so forth and so on.”<sup>659</sup>
- **Google Q3 2010 Earnings call – Mr. Rosenberg:** “Finally, third big number, \$1 billion. Mobile is on an annualized run rate of over \$1 billion. This means the people who are accessing our products and services through their mobile phones are adding a \$1 billion annually to our existing revenue streams. Clearly, this is the future of search in the Internet, more people in more countries coming online from these smartphones. Our mobile search queries have grown five times over the past couple of years. And of course, a lot more of those queries are now coming from Android phones.”<sup>660</sup>
- **Google Q3 2012 Earnings Call – Lawrence Page:** “...mobile search queries and mobile commerce are growing dramatically across the world.”<sup>661</sup>
- **Google Q3 2012 Earnings Call – Lawrence Page:** “This time last year, I announced that our run-rate for mobile advertising hit \$2.5 billion. That seemed like a pretty big number even for Google. But now we have built up additional mobile revenue from users paying for content and apps in Google Play. Including these new sources grossed up, I can announce our new run-rate for mobile is now over \$8 billion. That’s quite a business.”<sup>662</sup>

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<sup>658</sup> Google Inc. Q3 2010 Earnings Call Transcript,  
<http://www.morningstar.com/earnings/printtranscript.aspx?id=18282869>.

<sup>659</sup> Google Inc. Q3 2010 Earnings Call Transcript,  
<http://www.morningstar.com/earnings/printtranscript.aspx?id=18282869>.

<sup>660</sup> Google Inc. Q3 2010 Earnings Call Transcript,  
<http://www.morningstar.com/earnings/printtranscript.aspx?id=18282869>.

<sup>661</sup> Google Inc. Q3 2012 Earnings Call Transcript, <http://seekingalpha.com/article/934071-googles-ceo-discusses-q3-2012-results-earnings-call-transcript?part=single>.

<sup>662</sup> Google Inc. Q3 2012 Earnings Call Transcript, <http://seekingalpha.com/article/934071-googles-ceo-discusses-q3-2012-results-earnings-call-transcript?part=single>.



- **Google Q1 2015 Earnings Press Release – Patrick Pichette:** “Google. “We continue to see great momentum in our mobile advertising business and opportunities with brand advertisers.”<sup>663</sup>

***Publicly Available Information***

- **Venturebeat.com:** “Google is on-track to make \$1 billion in revenue from mobile this year.”<sup>664</sup>
- **New York Times:** “Android’s contribution to Google’s revenue, its strategic value probably accounts for \$30 billion to \$50 billion of Google’s \$190 billion market Capitalization.”<sup>665</sup>
- **June 2011 Fortune Magazine Article:** In June 2011, Fortune Magazine published an article entitled “100 Million Android Fans Can’t be Wrong.” According to this article:

*“Android device makers often build a search button into the hardware, and most users can find a search widget on the home screen. But Rubin says Android phones in general are more integrated with people’s lives. “That pervasiveness pays off on people doing more searches, but people do more of everything,” he adds. . . . Although Google doesn’t break out Android specifically, Rubin says Android is profitable and cash-flow positive, and it’s all through ads.”<sup>666</sup>*

- **Mr. Rubin Interview at December 2010 Dive Into Mobile Conference:** During a December 2010 conference sponsored by All Things Digital, Mr. Rubin was interviewed and confirmed the profitability of the Android platform. According to Mr. Rubin, Google was “making money on the advertising that’s generated through Android.”<sup>667</sup> Mr. Rubin later added that “I can just do the Google thing. Which is an ad-based business model. And we’re profitable.”<sup>668</sup>
- **May 2015 Introduction to Google** – A May 2015 Google presentation entitled “Introduction to Android” reported that Google realizes profit of [REDACTED] Android device during its “lifetime,” [REDACTED]) of which was attributable to Search Ads.<sup>669</sup>

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<sup>663</sup> Google Inc. Announces First Quarter 2015 Results,

[https://investor.google.com/earnings/2015/Q1\\_google\\_earnings.html](https://investor.google.com/earnings/2015/Q1_google_earnings.html).

<sup>664</sup> <http://venturebeat.com/2010/10/14/google-making-1-billion-a-year-from-mobile/>.

<sup>665</sup> New York Times, Android is No. 1, But Google Says It Still Makes Little Money.,

[http://bits.blogs.nytimes.com/2012/01/20/android-small-revenues/?\\_r=0](http://bits.blogs.nytimes.com/2012/01/20/android-small-revenues/?_r=0)

<sup>666</sup> “100 million Android fans can’t be wrong,” Fortune.com, June 16, 2011.

<sup>667</sup> <http://allthingsd.com/20101214/d-dive-into-mobile-the-full-interview-video-of-google-androids-andy-rubin/>, minute 20:40 to 20:48.

<sup>668</sup> <http://allthingsd.com/20101214/d-dive-into-mobile-the-full-interview-video-of-google-androids-andy-rubin/>, minute 21:00 to 21:25.

<sup>669</sup> GOOG-00130338 – 386 at 343.



## 12. STATUTORY DAMAGES

317. There are four copyrighted works at issue in this case, each of which, I understand, has been copied by Google into various version of Android as established during the first trial of this case and as set forth in the Zeidman Report with respect to the new versions of Android. The four copyrighted works are:
- Certificate of Registration, Java 2 Standard Edition 1.4, TX0006196514, Trial Ex. 464;
  - Certificate of Registration, Java 2 Standard Edition 5.0, TX0006066538, Trial Ex. 475;
  - Certificate of Registration, Java Standard Edition 6, TX0006848555, Trial Ex. 659;
  - Certificate of Registration, Java Standard Edition 7, TX0008125950.<sup>670</sup>
318. Pursuant to the Copyright Act, Oracle is entitled to one award of statutory damages per work for Google's infringement, ranging from \$750-\$30,000 per work for non-willful infringement. For willful infringement, Oracle may be awarded up to \$150,000 per work.
319. I have been asked, based on my professional experience and in light of the available evidence, to calculate the appropriate statutory damages figure. I understand that Oracle may elect to receive statutory damages under the Copyright Act instead of actual damages and disgorgement of profits.
320. It is my conclusion, based on my review of evidence, that due to the significant lost opportunity costs to Oracle arising from Google's infringement of the copyrighted Java works (as set forth herein) and the magnitude of the benefit obtained by Google as a result of their copying of the works (also as set forth in this report), the benefits to Google far exceed the available statutory range, and thus Oracle should be awarded the maximum amount available under the statute.
321. If Google's infringement is not found to be willful, Oracle should be awarded statutory damages of \$30,000 per work for a total of \$120,000.
322. If Google's infringement is found to be willful, Oracle should be awarded statutory damages in the amount of \$150,000 per work for a total of \$600,000.

## 13. PREJUDGMENT INTEREST

323. From an economic analysis standpoint, a time-value-of-money award would be necessary to compensate Oracle for the loss of use of funds during the damages period. However, I understand that an award of prejudgment interest is a legal matter and that the Court has substantial discretion in determining the interest rate and compounding method to be awarded.

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<sup>670</sup> OAGOOGL3000000504-511; see also OAGOOGL3000000500-503, OAGOOGL3000000512-517, OAGOOGL3000000496-499, OAGOOGL3000000518-523.



I have not prepared any prejudgment interest calculations as of this date, but am prepared to do so if requested by the Court.

**14. SIGNATURE**

I declare under penalty of perjury that the forgoing is a true and correct summary of my opinions in this matter,

James E. Malackowski

January 8, 2016



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November 24, 2015

## JAMES E. MALACKOWSKI CURRICULUM VITAE

**James E. Malackowski** is the Chairman and Chief Executive Officer of Ocean Tomo, LLC, the Intellectual Capital Merchant Banc™ firm providing industry leading financial products and services related to intellectual property including financial expert testimony, valuation, strategy consulting, proprietary research products, investment services, risk management products, innovation management services and transaction brokerage. Ocean Tomo assists clients – corporations, law firms, governments and institutional investors – in realizing Intellectual Capital Equity® value broadly defined. Subsidiaries of Ocean Tomo include: Ocean Tomo Risk Management, LLC; Ocean Tomo Asset Management LLC; OTI Data Networks, LLC; Patent Marking, LLC; and Ocean Tomo Capital, LLC – publisher of the Ocean Tomo 300® Patent Index family (NYSE: OTPAT) and Ocean Tomo Investments Group, LLC, a registered broker dealer. Ocean Tomo is the creator of the live public open cry auction marketplace for intellectual property and the exclusive source for Ocean Tomo Ratings™.

Mr. Malackowski is a founding and continuous member of the IP Hall of Fame Academy. He has been recognized annually since 2007 by leading industry publications as one of the ‘World’s Leading IP Strategists’. Significantly, Mr. Malackowski is listed among “50 Under 45” by *IP Law & Business*™; included in the *National Law Journal*’s inaugural list of 50 Intellectual Property Trailblazers & Pioneers; and, named as one of “The Most Influential People in IP” by *Managing Intellectual Property*™. Mr. Malackowski was named as 1 of 50 individuals, companies and institutions that framed the first 50 issues of *IAM Magazine* as well as 1 of 60 leading global Economics Expert Witnesses by the same publication in 2014. In 2011 Mr. Malackowski was selected by the World Economic Forum as one of less than twenty members of the Network of Global Agenda Councils to focus on questions of IP policy. In 2013 he was inducted into the Chicago Area Entrepreneurship Hall of Fame by the Institute for Entrepreneurial Studies at the University of Illinois at Chicago College of Business Administration.

Mr. Malackowski has advised clients and counsel on business valuation issues as well as all phases of the technology transfer process. He has substantial experience as a Board Director for leading technology corporations and research organizations as well as companies with critical brand management issues. He is Past President of The Licensing Executives Society International, Inc. as well as its largest chapter, LES USA & Canada, Inc. Today, Mr. Malackowski focuses his non-for-profit efforts with organizations leveraging science and innovation for the benefit of children, including those located in lesser developed countries. He is a Director of the Stanley Manne Children’s Research Institute and has served since 2002 as a Trustee or Director of Invent Now, Inc., an organization providing summer enrichment programs for more than 90,000 students annually. He is the Founder of the Chicago based Center for Applied Innovation (CAI), an Illinois non-for-profit corporation created to manage education, public policy outreach and related economic activity around applied technology and intellectual property rights.

Mr. Malackowski is a frequent speaker on emerging technology markets and related financial measures. He has addressed mass media audiences including Bloomberg Morning Call, Bloomberg Evening Market Pulse, Bloomberg Final Word, CNBC Closing Bell, CNBC On the Money, CNBC Street Signs, CBS News Radio and Fox Business National Television as well as other recognized news-based internet video channels. Mr. Malackowski is a judge on behalf of the Illinois Technology Association’s CityLIGHTS™ Innovation Awards program and has also appeared as a judge on PBS’s *Everyday Edisons*.



On more than fifty occasions, Mr. Malackowski has served as an expert in U.S. Federal Court, U.S. Bankruptcy Court, State Court, the Ontario Superior Court of Justice or the International Trade Commission on questions relating to intellectual property economics including the subject of business valuation, reasonable royalty, lost profits, price erosion, commercial success, corrective advertising, creditor allocations, Hatch Waxman Act market exclusivity, business significance of licensing terms including RAND obligations, and equities of a potential injunction. As an inventor, Mr. Malackowski has more than twenty issued U.S. patents. He is a frequent instructor for graduate studies on IP management and markets and a Summa Cum Laude graduate of the University of Notre Dame majoring in accountancy and philosophy. Mr. Malackowski is Certified in Financial Forensics, a Certified Licensing Professional and a Registered Certified Public Accountant in the State of Illinois.

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**PRINCIPAL  
EXPERIENCE**

Co-Founder, Chairman and Chief Executive Officer, *Ocean Tomo, LLC*, July 1, 2003 to present. Mr. Malackowski is responsible for all aspects of the firm's merchant banking practice.

Founder, *The Intellectual Property Exchange International, Inc.* Mr. Malackowski guided initial product development of IPXI and recruitment of executive management. In 2011, IPXI was funded by an industry consortium including the Chicago Board Options Exchange. Mr. Malackowski was the Chair or Co-Chair of the Exchange from inception to February 26, 2015.

President and Chief Executive Officer, *IP Equity Management, LLC*, doing business as Duff & Phelps Capital Partners, March 1, 2002 to June 30, 2003. The firm's intellectual property structured finance efforts were consolidated with Ocean Tomo on July 1, 2003.

Principal and Founder, *VIGIC Services, LLC*, July 1, 2000 to February 28, 2002. Mr. Malackowski identified and evaluated intellectual capital based private equity investment opportunities and served as an advisor to four completed transactions.

Principal and co-Founder, *IPC Group LLC*, August 1, 1988 – June 30, 2000. Mr. Malackowski also held the offices of President and CEO and was a Board member / chairman of the firm. Along with four co-founders, Mr. Malackowski grew IPC Group to become the largest professional services firm specializing in intellectual property valuation and strategy consulting. IPC Group was sold in 1999 later changing its name to InteCap.

Executive Consultant, *Peterson & Co. Consulting*, Chicago, June 3, 1985 – July 30, 1988. Mr. Malackowski began with Peterson as a Staff Consultant and was the firm's quickest promotion to both Senior Consultant and Executive Consultant. Mr. Malackowski helped to establish the firm's intellectual property litigation and valuation practice. Peterson & Co. was sold to Saatchi & Saatchi PLC in 1988.

Chairman and CEO, *JEMAN Technologies, Inc.* 1995 – 1999. Mr. Malackowski led the company's efforts to develop new technologies related to wireless direct response services. JEMAN was sold to ewireless, Inc. in 1999 as part of a venture transaction funded by Bedrock Capital Partners and Tredegar Investments.



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**NON-PROFIT AND  
ASSOCIATION  
EXPERIENCE**

Mr. Malackowski has been active in The Licensing Executives Society (LES) locally, nationally and internationally. LES is the premiere global professional association of technology transfer and intellectual asset management professionals with more than 10,000 members in more than 32 countries.

Mr. Malackowski is Past President of the Licensing Executives Society International, LLC, where his experience included the following positions:

- Chair, Past President's Council (2012 – 2013)
- President and Member of the Board (2011 - 2012)
- President Elect and Member of the Board (2010 - 2011)
- Secretary and Member of the Board (2007 - 2010)
- Member and Permanent Alternate, Board of Delegates (1992 - 2005)
- Past Chair, Membership, Investment, Education, Long-range Planning and Global Technology Impact Forum Committees.

Mr. Malackowski's term as President of LESI has been recognized for creation of the LESI Global Technology Impact Forum and concurrent Invent For Humanity™ Technology Transfer Exchange Fair; formalizing the National Presidents' Council; establishing the position of a permanent Executive Director; and, restructuring the leadership of LESI committees utilizing a Chair, Past Chair, Chair Elect ladder combined with functional responsibilities for committee Vice Chairs. This later organizational stamp is based largely on Mr. Malackowski's experience as President of LES USA & Canada described below where he led a restructuring of the Board from a regional to a functional focus for each officer and Trustee. As with his tenure at his national Society discussed below, Mr. Malackowski led a financial turn-around returning LESI to positive cash flow following its' only two years of loss.

Mr. Malackowski is also Past President of The Licensing Executives Society (USA and Canada), Inc. where he held numerous offices in the organization including:

- President and Member of the Board (2001 – 2002)
- International Vice President and Member of the Board (2000)
- Treasurer and Member of the Board (1996 -- 1999)
- Trustee and Member of the Board (1992 – 1996)
- Chair, Annual Meeting in Miami Beach (1998) and the Summer Meeting in Chicago (1997)

Mr. Malackowski presided over a restructuring of the LES USA & Canada Board and a financial turn-around returning the organization to positive cash flow following its only two years of loss. Mr. Malackowski is the youngest President to hold office at LES USA & Canada as well as at LES International.

In 2007, Mr. Malackowski was the Founding Chair of the Board of Governors for what is now Certified Licensing Professionals, Inc., administrator of the Certified Licensing Professional (CLP) program for professionals in the fields of





licensing, business development and commercialization of intellectual property. More than 1,000 individuals involved in patenting, marketing, valuation, IP law, negotiation, and intellectual asset management have earned the CLP certification. CLP, Inc. is a 501(c)(6) organization whose mission is to elevate the licensing profession through knowledge and standards.

Mr. Malackowski extends significant time to non-profit activities directed towards a further understanding of the economic importance of innovation and intellectual property, in both the United States and developing economies. These efforts include:

- Judge, Illinois Technology Association, CityLIGHTS™ Innovation Awards (2013 - )
- Member, World Economic Forum Network of Global Agenda Councils (2011 - 2012)
- Director, International Intellectual Property Institute, Washington D.C., (2002 - 2007)
- Resident Advisor, U.S. Information Agency, (1999)
- Resident Advisor, U.S. Department of Commerce Commercial Law and Development Program (1997)
- Founder and Chairman, The Center for Applied Innovation, Inc. (2004 - )

In addition to his University instruction described herein, Mr. Malackowski focuses his non-for-profit efforts with those organizations leveraging science and innovation for the benefit of children.

- Director, Children's Research Fund (2013); Co-Chair Annual Fund Campaign (2013)
- Director, Invent Now, Inc. (2006 - ); Trustee and Director, National Inventors Hall of Fame, Inc. (2001 - 2006); and, Member, NIHF Board Finance Committee (2006 - ). These organizations provide summer enrichment programs for more than 90,000 students annually including [Camp Invention™](#) for kids in grades 1-6 (and their parents and teachers); [Collegiate Inventors Competition™](#) for college students (and their mentors); and, [Club Invention™](#) for kids in grades 1-6 (and their parents and teachers).
- President's Council, Chicago Museum of Science and Industry (2005 - 2011) including participation on the Education Advisory Committee (2007 - 2009) and the Alternative Revenue Committee (2008 - 2011)
- Director, Stanley Manne Children's Research Institute (2009 - ) including Chair of the Board's Technology Transfer Committee (2014 - ) and the Strategic Planning Resources Committee (2011 - 2012)

Mr. Malackowski is the Founder of the Center for Applied Innovation, a Chicago based non-for-profit with both local and international programs. CAI was created to manage education, public policy outreach and related economic activity around applied technology and intellectual property (IP) rights in the State of Illinois and around the world.



- CAI created and patented the first commoditized contract for technology licensing, the Unit License Right™. This innovation has been licensed to the Chicago-based Intellectual Property Exchange International.
- Under Mr. Malackowski's continued leadership as Chairman, CAI organizes the Invent for Humanity™ Technology Transfer Exchange Fair (InventforHumanity.org) launched in January, 2012, in Geneva, Switzerland. Invent for Humanity showcases field-ready, sustainable innovations, known as "appropriate technologies", leveraging the experience of licensing professionals to match and structure the actual transfer of such technology to meet recognized needs of emerging market economies.

Mr. Malackowski's association and non-profit activities are informed in part by his participation in the Harvard Business School Executive Education Program on Governing for Nonprofit Excellence, November 2000.

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**RELATED  
OFFICES**

Berg, LLC, Member, Council of Advisors, Senior Advisor, Intellectual Property Licensing & Innovation (2012 - )

Curious Networks, Inc., Director, (1999 - 2000), Co-Chair of the Board's Strategic Partnership Committee. Mr. Malackowski led the company's first and second round of venture funding.

ewireless, Inc. (f/k/a JEMAN Holdings, Inc. d/b/a Cellular Linking), Director, (1995-1999, 2000-2002)

Ford Global Technologies, Inc., Ford Motor Company, Director (1997 - 2001). Mr. Malackowski advised Ford Motor Company on the original business strategy which led to the formation of FGTI. FGTI was the largest known technology management company in the United States during Mr. Malackowski's term.

Infocast, Corporation (OTC BB: IFCC.OB), Director (2001-2002). Member of the Audit and Compensation Committees. Mr. Malackowski led the transition of the company's senior management team and continued U.S. based funding efforts.

Insignis, Inc., Director (2000 - 2002) Mr. Malackowski led the company's first round of venture funding. Insignis is a Chicago based provider of institutional financial data services.

Solutionary, Inc., Director (2000 - 2013). Arranged and advised on Solutionary's asset acquisition of S3Networks effective August 31, 2001 and sale to strategic buyer in 2013. Member of the Board's Compensation Committee.

TuShare, LLC, Advisor (2012 - )

422, Inc., Director (2002 - 2003)



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**EDUCATION AND  
CERTIFICATION**

University of Notre Dame, B.B.A., Bachelor of Business Administration with majors in Accountancy and Philosophy. Graduated Summa Cum Laude, 1985.

Registered Certified Public Accountant, State of Illinois Certificate Number 41,187 issued January 16, 1986; License No. 239.007831; Expires September 30, 2018.

Certified Licensing Professional, Certificate Number 1606 issued July 1, 2008; Expires June 30, 2017.

Certified in Financial Forensics, CFF™, American Institute of Certified Public Accountants, Certificate Number 391 issued July 31, 2008; Expires December 31, 2014.

Accredited in Business Valuation, ABV™, American Institute of Certified Public Accountants, Certificate Number 4278 issued May 31, 2014.

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**UNIVERSITY  
INSTRUCTION**

John Marshall Law School, Intellectual Property Damages (1992 - 1994)

DePaul University, Intellectual Property Entrepreneurial Finance (2003)

The George Washington University Law School, Intellectual Property Management (2004)

The University of Chicago Graduate School of Business:

- Intellectual Property Investment (2004 - 2006)
- Entrepreneurial Discovery, MBA Course 34705, Adjunct Professors Mark Tebbe and Brian Coe (Fall 2014 - 2015)

Indiana University Kelly School of Business, Intellectual Property Finance (2005)

University of Notre Dame, Mendoza College of Business, Adjunct Instructor:

- MBA Interterm Intensives, Intellectual Property Based Market Transactions, Valuation and Trading (Fall 2006, Fall 2008)
- MBA Executive Program, Course MBAE 70639, Intellectual Property, (Spring Semester 2008)
- MBA Program, Litigation Support and Valuation (Spring 2009)

University of California at Berkeley Haas School of Business, Innovation Markets (2008)

Chicago-Kent College of Law, Adjunct Professor of Law, IP Financial Markets and Legal Principles (Fall 2008)



Rutgers Professional Science Master's Program, Fundamentals of Intellectual Property (Summer 2011)

Northwestern University Kellogg School of Management, MGMT 441-61 and MGMT 441-76 Intellectual Property Management, Clinical Professor James G. Conley (Fall 2012, Spring 2013, Spring 2014, Spring 2015)

University of Texas McCombs School of Business, MBA Course: Open Innovation, Professor Sirkka Jarvenpaa (Spring 2013)

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**ACTIVE  
MEMBERSHIPS**

American Institute of Certified Public Accountants, Member 01182237 (1985 -)  
The Economic Club of Chicago (1990 - )  
The Licensing Executives Society (1988 - )  
Young Presidents' Organization - World President's Organization (2006 - )

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**RECOGNITION  
AND AWARDS**

Individually, Mr. Malackowski has been recognized for his expertise as well as his work in developing markets for intellectual property transfer including:

- Named to the *National Law Journal's* inaugural list of 50 Intellectual Property Trailblazers & Pioneers. (August 2014)
- Named as 1 of 60 leading global Economics Expert Witnesses in the *IAM Patent 1000, IAM Magazine*. Selection based on interviews by IAM researchers with more than 100 patent litigators. (May 2014)
- Inductee, Chicago Area Entrepreneurship Hall of Fame as selected by the Institute for Entrepreneurial Studies at the University of Illinois at Chicago College of Business Administration, (2013; 28<sup>th</sup> Year of Program)
- Named as 1 of 50 Individuals, Companies and Institutions that Framed the First 50 Issues of *IAM Magazine*, November / December 2011.
- "IP Personalities of 2008", *IAM blog* by Joff Wild, Editor
- "IAM Strategy 300: The World's Leading IP Strategists", *IAM Magazine* (2012-2015)
- "IAM Patent 1000: The World's Leading Patent Professionals", *IAM Magazine* (2015)
- "World's 250 Leading IP Strategists", *IAM Magazine* (2009-2011)
- "50 Under 45", *IP Law & Business*<sup>TM</sup> (2008)
- "The Most Influential People in IP", *Managing Intellectual Property*<sup>TM</sup> (2007)
- Member, IP Hall of Fame Academy (2007- )
- Mediator and Arbitrator, World Intellectual Property Organization, (1994)

Ocean Tomo as a firm has been likewise recognized for its accomplishments including:

- Ocean Tomo was recognized as a member of the 2015 *Inc.5000*<sup>®</sup> list of fastest-growing private companies in America.



- Ocean Tomo was honored in 2011 with the “Best of Chicago Award in Investment Advisory Services” by the U.S. Commerce Association (USCA).
- In addition to Mr. Malackowski, Ocean Tomo as a firm was named as 1 of 50 Individuals, Companies and Institutions that Framed the First 50 Issues of *IAM Magazine*, November / December 2011 and the only firm other than Microsoft (2 of 50 mentions) to be recognized multiple times (5 of 50 mentions).
- The firm’s Chicago office was presented the *2011 Alfred P. Sloan Awards for Business Excellence in Workplace Flexibility* after having been finalist for scoring in the top 20% of all firm’s measured nationally.
- Ocean Tomo was recognized in 2010 by Corporate Voices for Working Families for its work-life balance as part of the National Workplace Flexibility Campaign published by *USA Today*.
- Ocean Tomo was recognized as a juried Finalist for the Illinois Technology Association 2010 CityLIGHTS Award for raising the stature of the Illinois technology industry.
- Selected as case study organization for Haas School of Business, University of California, Berkeley (2009)
- Selected as case study organization for Harvard Business School MBA Program (2008)
- Ocean Tomo was named one of 20 small and mid-sized firms recognized as the “Best Places to Work in Illinois” by Best Companies Group in a competition sponsored by the Illinois Chamber of Commerce and the Illinois State Council Society for Human Resource (2007)
- Ocean Tomo Auctions received the 2006 Chicago Innovation Award for most innovative new product or service introduced between January 1, 2005, and July 31, 2006, that uniquely satisfied unmet needs in the marketplace. The award was presented by Kuczmarski & Associates and the *Chicago Sun-Times*.
- Ocean Tomo Auctions was awarded the Department of Commerce Technology Administration & National Knowledge & Intellectual Property Management 2006 Innovator of the Year Award.
- Ocean Tomo was recognized as a “Top Ten IP Newsmakers of 2006” by *IP Law & Business*, Almanac 2006.

Numerous authors and graduate business programs have written case studies about Ocean Tomo and its affiliates including:

- Piscione, Deborah Perry, [The Risk Factor](#), Copyright 2014.
- Houle, David, [Entering the Shift Age](#), Copyright 2013.
- Kuczmarski, Thomas D., Dan Miller and Luke Tanen, [Innovating Chicago-Style: How Local Innovators Are Building The National Economy](#), Copyright 2012.
- Houle, David, [The Shift Age](#), Copyright 2007.
- Chesbrough, Henry, [Open Business Models: How to Thrive in the New Innovation Landscape](#), Copyright 2006.
- Harvard Business School Case Study
- University of California Business School Case Study



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**RELATED U.S.  
SPEECHES AND  
PUBLICATIONS**

“The Determination of a Reasonable Royalty: Hypothetical Negotiation v. A General License Agreement”, The Licensing Executives Society, Chicago Chapter, December 8, 1987.

“The Business Economics of Technology Development”, The Licensing Executives Society, New England Chapter, February 9, 1988.

“The Importance of Protecting Intellectual Property Through Corporate Transition”, Licensing Executives Society, National Meeting, October 18, 1989, Moderator.

“Valuation of Intellectual Property Rights”, The Chicago Bar Association, March 6, 1990.

“Dispute Resolution -- There Are Alternatives!”, Licensing Executives Society, National Meeting, October 22, 1990.

“How to Value a License”, Adding to the Bottomline Through Licensing, LES / John Marshall Law School, November 1, 1990.

“An Advanced Discussion on Licensing and Patent Damages”, Licensing Executives Society, National Meeting, October 28, 1992.

“An Advanced Discussion on Patent Damages”, Licensing Executives Society, National Meeting, October 18, 1993.

Royalty Provisions in Technology License Agreements, Technology Transfers, American Conference Institute, November 15 & 16, 1993.

“Commercializing Technology and the Intellectual Property Quality Management Imperative”, Technology Transfer, American Conference Institute, June 20 & 21, 1994.

“How to Accurately Value Software”, The Software Protection and Litigation Institute, July 28 & 29, 1994.

“IP Damages Advanced Case Studies”, Licensing Executives Society, National Meeting, October 19, 1994.

“Preparation and Presentation of Damages by Outside Consultants”, AIPLA Mid-Winter Meeting, February 1, 1995

“Damages Discovery - An Expert's Perspective”, Intellectual Property Law Association, New York, December 15, 1995.

“Pre-Litigation Damages Techniques: Patents and More”, The Intellectual Property Strategist, March, 1996.



“Corporate Exposures to Copyright, Patent, Trademark, and Trade Secret Claims”, Digital Bullets - Digital Shields: A Financial Perspective, American Conference Institute, New York, March 5, 1996.

“IP Management and Taxation - How companies are proactively managing IP assets to maximize shareholder value, including measuring contribution of IP protection to corporate value”, American Bar Association, Virginia, April 11, 1996.

“Effectively Select & Use Experts in Trademark & Copyright Cases”, AIPLA Spring Meeting, Boston, May 1, 1996.

“The Industry-University Interface: Mechanisms For Technology Transfer”, 1996 AUTM Central Region / Licensing Executives Society Chicago Chapter, Chicago, July 21, 1996.

“Valuing Health Care Technologies”, Licensing Executives Society Winter Meeting, South Carolina, March 13, 1997.

“Creative Marketing & Packaging - How to Differentiate Yourself in a Competitive Market”, CTIA Annual Meeting, Atlanta, February 23, 1998.

“Intellectual Property Valuation: The Latest Techniques from Boardroom and Courtroom”, Patent Law Association of South Florida Annual Meeting, Fort Lauderdale, October 22, 1998.

“The Aftermath of *Rite-Hite v. Kelly*”, 16<sup>th</sup> Judicial Conference of the U.S. Court of Appeals for the Federal Circuit, Washington D.C., April 6, 1999.

“Expert Admissibility After Daubert”, Wisconsin Academy of Trial Lawyers, Milwaukee, December 3, 1999.

“Intellectual Property Strategic Planning: a Corporate Perspective”, Research Directors Association of Chicago, Winter Meeting, January 10, 2000.

“Intellectual Property Asset Management: Linking IP and Corporate Strategy”, 44<sup>th</sup> Annual Conference on Developments in Intellectual Property Law, John Marshall Law School, Chicago, February 25, 2000.

“Boost Your Client’s Intellectual Capital IQ: Get Top Management Involved”, Corporate Legal Times, October 2000, p. 104.

“Strategic and Financial Opportunities for Privately Held and Public Middle Market Companies: Building Shareholder Value”, The Standard Club, Chicago, October 5, 2000.

“Commercializing Intellectual Capital Through Venture Funding”, LESI Expanded Board of Directors Meeting and Seminar, Delray Beach, Florida, January 26, 2001; LES Chicago Meeting, May 10, 2001.





“New Paths to Growth: Joint Ventures and Accessing Equity Capital”, Panel Presentation and Discussion, LaSalle Street Project Economic Summit, Chicago, May 10, 2001.

*ViewPoints*, The Newsletter of the Licensing Executives Society (U.S.A. and Canada), Inc., President’s Column: Vol. VIII No. 5, Nov. / Dec. 2001, “President Changes the Way LES Does Business”; Vol. VIV No. 1, Jan. / Feb. 2002, “It’s Time To Count Our Intellectual Assets”; Vol. VIV No. 2; Vol. VIV No. 3, May / June 2002, “Mid-Year Review”; Vol. VIV No. 4, July / August 2002, “Ethical Issues Related To Intellectual Property”.

“Venture Investment Grounded In Intellectual Capital”, From Ideas To Assets: Investing Wisely in Intellectual Property, Edited by Bruce Berman, John Wiley & Sons, Inc., 2002.

“Current Issues in Accounting for Intangibles”, Congressional Economic Leadership Institute, Panel Presentation and Discussion with Steven H. Wallman, Former Commissioner, United States Securities and Exchange Commission, Washington, DC, May 1, 2002.

“Intellectual Capital Based Corporate Carve-outs: Strategy, Structure and Funding”, James E. Malackowski and Suzanne Harrison, The LESI Guide to Licensing Best Practices, Edited by Robert Goldscheider, John Wiley & Sons, Inc., 2002.

“Intellectual Property Finance: Securitization to Venture Capital”, American Bar Association Intellectual Property Law Conference, Philadelphia, June 28, 2002.

“The IIPi Roundtable: The New Emphasis on Patent Value – Opportunities and Challenges”, Washington DC, July 22, 2002.

“Moving Technology from University to Marketplace: Business Creation and the Venture Capital Community, Licensing Executives Society Annual Conference, Chicago, September 24, 2002.

“Presidents’ Forum on Intellectual Property: A Leadership Discussion with The Licensing Executives Society, the American Intellectual Property Law Association, the Association of University Technology Managers, the Intellectual Property Owners Association, The National Inventors Hall of Fame, and BIO”, Licensing Executives Society Annual Conference, Chicago, September 24, 2002.

“Extracting Value From Your Intellectual Asset Portfolio: Ensuring ROI from IP and Technology Assets”, World Research Group, November 22, 2002, Chicago, Illinois.

“Licensing”, American Intellectual Property Law Association 2003 Mid-Winter Institute, Marco Island, Florida, January 22 – 25, 2003.

“Cashing in on Chicago: A Closer Look at Liquidity in the Heartland”, The Executives’ Club of Chicago, Panel Discussion, February 11, 2003.



Conference Chair and Speaker, “Optimizing Valuation & Value Realization of your IP/Intellectual Assets”, World Research Group, Las Vegas, February 27-28, 2003.

Live Webcast, “Turning Your Intellectual Property into Cash”, Ernst & Young Business Insights, April 28, 2003.

Intermediate PDS Workshop: Application of Private Equity and Leveraged Finance Investing to Intellectual Property, LES / AUTM Summer Meeting, Philadelphia, May 8, 2003.

World Research Group, Advanced Intellectual Property Structured Finance, Conference Co-Chair Person, New York City, June 29-30, 2003.

The Conference Board, The 2003 Conference on Intellectual Asset Management & Value Reporting, “Application of Private Equity and Leveraged Finance Investing to Intellectual Property”, Chicago, June 4, 2003.

Intellectual Property and Information Technology for Investment Funds, “Intellectual Capital Equity Management”, Panel Discussion Sponsored by Schulte Roth & Zabel, New York City, June 18, 2003.

Chicago Capital Access Forum III, “Private Investors: The Case for Domestic Emerging Market Investments”, Panel Discussion, Chicago, June 26, 2003.

Pension Consultants’ Forum, “Extracting Value from Private Equity Investing”, World Research Group, Chicago, July 22, 2003.

Midwest Intellectual Property Institute, “Intellectual Capital Equity Management”, Minneapolis, September 19, 2003.

“Intellectual Asset Strategies”, Add-On Seminar at the 2003 Licensing Executives Society Annual Meeting, San Diego, September 25, 2003.

“Leveraging Intellectual Property”, Keynote Speaker, Thomson Financial Thought Leadership Forum, New York, October 8, 2003.

“Beyond Licensing: Innovative Techniques for Extracting Value”, Advanced Forum on Licensing Intellectual Property, San Francisco, December 9, 2003.

Intellectual Asset Management, Column: *IP Merchant Banker*, Douglas R. Elliott & James E. Malackowski, Issue 01, “Challenges of the Fifth Epoch”, July / August 2003; Issue 02, “What the Market Fortells”, September / October 2003; Issue 03, “Economics, Ethos and Intellectual Ethics”, December / January 2004; Issue 04, “Patent Predictions – facts or fictions?”, February / March 2004; “Wealth management in the age of patents”, June / July 2004; “Patent pools – the 80% solution”, August / September 2004.

“Intellectual Capital Equity Management: IP as an Asset Class”, Minnesota State Bar Association Continuing Legal Education, Minneapolis, January 15-16, 2004.



“Understanding the Motivations Behind an IP Structured Finance Transaction”,  
“Analyzing the Anatomy of A Patent-Based Structured Finance Transaction”,  
World Research Group, New York, January 21-22, 2004.

“Managing Your Intellectual Property”, Investment Banking for Women /  
Minority Owned Business Enterprises, Annual Forum, Conference Co-  
Chairperson, Chicago, March 3-5, 2004.

“Private Equity: Investor Capital for Mature Businesses”, *DreamMakers* Forum  
2004, Santa Barbara, California, March 7 – 10, 2004.

“IP Finance: Convergence of IP Valuation and Value Creation”, World  
Research Group 2<sup>nd</sup> Annual Strategies and Solutions for Optimizing IP  
Valuation & Value Creation, Chicago, March 23 – 24, 2004.

“Leveraging the Value of Intellectual Property”, Creating, Managing & Valuing  
an Intellectual Property Portfolio, Vedder Price Conference Series, Chicago,  
April 28, 2004.

“Federal Circuit Damages Decision Emphasizes the Importance of Sound  
Economic Models”, IP Review, McDermott Will & Emery, with Robert M.  
Hess, Spring 2004.

“Intellectual Property Merchant Banking: Leveraging Corporate Intangible  
Assets”, The Licensing Executives Society (U.S.A. & Canada), Inc., Fairfield-  
Westchester Counties Chapter, June 23, 2004.

“Intellectual Property Financing and Securitization: Conclusions and Future  
Implications for Financing the IP Market”, New York, New York, July 21,  
2004.

“Emerging Financial Concepts in IP Asset Management”, Mining Patent  
Portfolios, Seattle, Washington, September 13, 2004.

“Intellectual Property Investment”, National Institutes of Health,  
Commercialization Assistance Program, Larta Institute, Chicago, November 12,  
2004.

“Using Intellectual Property to Grow”, The Beacon, Chicagoland  
Entrepreneurial Center, Volume 3, Issue 4, December 10, 2004.

“Techniques for Assessing the Value of Your IP Portfolio”, The Wall Street  
Transcript Intellectual Property Conference, New York, January 27, 2005.

“The Tipping Point: Assessing Major Challenges and Growth Opportunities in  
IP Finance”, Moderator, The 3<sup>rd</sup> Annual Advancing IP Structured Finance  
World Research Group Conference”, New York, February 3, 2005.

“Commerce One IP Auction”, Optimizing IP Valuation and Value Creation,  
World Research Group Conference, Miami, March 30-31, 2005.



“Intellectual Capital Equity Management: IP As An Asset Class”, Minnesota Continuing Legal Education Conference, Minneapolis, May 12, 2005.

“Techniques for Evaluating IP Potential”, Life for After Rembrandts, Law Seminars International, Chicago, Illinois, August 4, 2005.

Keynote Address, 2<sup>nd</sup> Annual Intellectual Property Financing and Securitization Summit, New York, September 26, 2005.

“The Power of Intellectual Property in Private Equity Deals”, Association for Corporate Growth and The Licensing Executives Society Connecticut Chapters, Greenwich, Connecticut, October 6, 2005.

“Maximizing the Value of Distressed Debt Backed by Intellectual Property”, Financial Research Associates Distressed Debt Summit 2005, New York, October 7, 2005.

“To Sell or Not to Sell”, Licensing in the Boardroom 2005, a supplement to *Intellectual Asset Management* magazine, 2005.

Patent Auctions & Marketplaces: Leveraging Value from Under-employed Technologies, IP Master Class Presentation, Washington DC, January 10, 2006.

“Risky Business: Overlooking Patents as Financial Assets”, Making Innovation Pay, Edited by Bruce Berman, Published by John Wiley & Sons, Inc., 2006.

“The State of Development & Current Trends in IP Structured Finance” and “The Tipping Point: Assessing Major Challenges, Growth Opportunities and Future Trends in IP Finance”, Moderator, The 4<sup>th</sup> Annual Summit on IP Structured Finance, New York, March 22-23, 2006.

“Generating Revenue From Your Inventions”, IIR 2<sup>nd</sup> Annual Summit on IP Rights for Financial Services, New York, April 25-26, 2006.

“A Behind the Scenes Look at the Patent Bazaar: How Companies and Industry Are Buying and Selling Patents”, Innovators in IP Litigation, IP Law & Business, San Jose, California, May 17, 2006.

“Patent Markets and Their Impact to R&D Strategy”, Industrial Research Institute Annual Meeting, May 21-24, 2006, Colorado.

USC Gould School of Law 2006 Intellectual Property Institute; Featured Speaker, “A Final Word”; Panelist, “Patent Trolls: The Good, the Bad and the Ugly”; May 23, 2006, Los Angeles.

“Patent Auctions: Past, Present & Future”, The 50<sup>th</sup> Annual Conference on Developments in Intellectual Property Law, John Marshall Law School Center for Intellectual Property Law, May 25-26, 2006, Chicago. Speech published as “The Intellectual Property Marketplace: Past, Present and Future”, 5 J. Marshall Rev. of Intell. Prop. L. 605, (2006)



“Patent Auctions: Risky Endeavor or Legitimate Market Opportunity?”,  
Strafford Legal Teleconference Presentations, June 8, 2006.

The Intellectual Property Investment Summit: Connecting Investors with  
Strategic Intellectual Property Opportunities, Presented by the Center for  
Applied Innovation, Summit Co-Chairperson, June 15, 2006, Chicago.

Innovative Structures for Acquiring Intellectual Property: The Benefits,  
Challenges and Process, LSI Law Seminars International, Program Co-Chair,  
July 17, 2006, Chicago.

“Licensing and Intellectual Property”, Chicago Regional Independent Inventor’s  
Conference, Presented by the United States Patent and Trademark Office,  
Northwestern University School of Law, and the National Inventors Hall of  
Fame Foundation, July 28-29, 2006, Chicago.

“Reinventing the IP Marketplace – The Exclusive Ocean Tomo Patent Auction  
Case Study”, IP Licensing Summit: Practical Strategies to Maximize Revenue in  
Today’s Challenging Intellectual Property Marketplace, August 21-23, 2006,  
New York.

“Unlocking the Value of Intellectual Property Rights”, Conference of the  
International Bar Association, September 20, 2006, Chicago.

“This Too Shall Pass”, Americas IP Focus 2006, Managing Intellectual Property  
Rights, Copyright, Euromoney Institutional Investor, PLC, 2006.

“Developing Markets for Intellectual Assets and Technology”, 21<sup>st</sup> Annual  
Intellectual Assets and Technology Law Institute, October 5 & 6, 2006, Irving,  
Texas.

“Patent Damages” and “Patent Reform Efforts: An Update and Review”, The  
Sedona Conference Patent Litigation VII, October 12-13, 2006, Sedona,  
Arizona.

“Patent Auctions”, 44<sup>th</sup> Annual Intellectual Property Law Conference, The  
Center for American and International Law, November 9-10, 2006, Plano,  
Texas.

“The Future of Developing IP Markets”, 3<sup>rd</sup> Annual Monetization of Intellectual  
Property & Intangible Assets, Strategic Research Institute, November 16-17,  
2006, Boston.

“The IP Transactional Landscape”, Economics of IP Based Transactions,  
National Knowledge & Intellectual Property Management Taskforce Series  
Program, November 29-30, 2006, Washington, D.C.

Keynote Presentation, The Business of Intellectual Property Conference, Tech  
Council of Maryland, Rockville, Maryland, January 10, 2007.

Luncheon Speaker, Corporate Intellectual Property Roundtable, Georgia State  
University College of Law, Atlanta, January 24, 2007.



“Patent Markets”, American Intellectual Property Law Association, 2007 Mid-Winter Institute, New Orleans, January 24-27, 2007.

“Assessing the Real Value of Your IP Portfolio” and “Growing IP Impact on Public and Semi-Public Markets”, The 5<sup>th</sup> Annual Summit on Monetizing, Financing & Securitizing IP, New York, January 30-31, 2007.

“Ocean’s 300”, Moderator, World Intellectual Property Review 2007, pp. 16-20.

“The Intellectual Property Marketplace: Emerging Transaction and Investment Vehicles”, Co-author with Cardoza, Gray and Conroy, *The Licensing Journal*, Aspen Publishers, Vol. 27, No. 2, pages 1 - 11, February 2007.

“The Importance of Emerging Intellectual Property Market Opportunities to the City of Chicago”, Keynote Speaker, Notre Dame Club of Chicago Meeting, Chicago, March 8, 2007.

“The Intellectual Property Marketplace”, Harvard Business School Club of New York, New York, April 12, 2007.

Keynote Address, BRICs & Mortar: Technological Drivers in Booming Economies of Brazil, Russia, India and China, Northwestern University Journal of Technology & Intellectual Property Second Annual Symposium, Chicago, April 13, 2007.

“Innovation Measurement: The Economic Impact of Patent Value”, Co-author with Barney, Cardoza, Walker and Gray, Submission to United States Department of Commerce Economics and Statistics Administration, Pursuant to Notice in the Federal Register, Vol. 72, No. 71, 18627, May 11, 2007.

“Objective Patent Valuation”, Business Meeting, Association of Corporate Patent Counsel, Newport, Rhode Island, June 27, 2007.

“Intellectual Property Exchange Chicago”, a two day symposium presented by The National Knowledge & Intellectual Property Management Taskforce and The Center for Applied Innovation, Moderator and Speaker, July 17 – 18, 2007, Chicago.

“Start-up Stories: Tales from the Front Line”, TiE Midwest, August 1, 2007, Chicago.

Keynote Address, Notre Dame Financial Executives Alumni Conference, September 21, 2007, South Bend, Indiana.

“The Birth of an IP Marketplace”, Missouri Bar Association Seminar, November 2, 2007, St. Louis, Missouri.

“Market Forces and IP”, The Giles S. Rich American Inn of Court, Howard University, January 17, 2008.



“Market for Technology: Challenges and Opportunities”, Panel Discussion on Impediments to Technology Markets, Duke University’s Fuqua School of Business, February 20, 2008.

“IP Markets – An Intangible Walk Down Wall Street”, Keynote Address, Securities Industry and Financial Markets Association, March 11, 2008, New York.

“Patent Valuation, Is there One or Many?”, Mini-Plenary Session of the High Tech Sector, The Licensing Executives Society International Annual Meeting, May 7, 2008, Chicago.

“What is Patent Quality – A Merchant Banc’s Perspective”, with Jonathan A. Barney, *les Nouvelles*, June 2008, p. 123 – 134.

“Intangibles in the Firm and Financial Markets”, *Intangible Assets: Measuring and Enhancing Their Contribution to Corporate Value and Economic Growth*, The National Academies, Washington DC, June 23, 2008.

“Developing IP Markets: Opportunity for the Financial Services Industry”, Keynote Address, The 5<sup>th</sup> Annual Patents & The Financial Services Industry Symposium, New York, July 29, 2008.

“New Trends in Monetizing IP Rights: Trolls, Licensing and Securitization”, *Managing Intellectual Property* Webinar, September 3, 2008.

“Magnificent Mile – Shopping for the Ideal IP Expert”, DRI Intellectual Property Litigation Seminar, September 4-5, 2008, Chicago.

From Assets to Profits: Competing for IP Value and Return, Contributing Author, Edited by Bruce Berman, John Wiley & Sons, November 2008.

Ocean Tomo: The New Kid on the (Auction) Block is All Grown Up, Institute for Law and Technology, 46<sup>th</sup> Annual Conference on Intellectual Property Law, November 10 – 11, 2008, Plano, Texas.

Federal Trade Commission: The Evolving Intellectual Property Marketplace, Keynote Address, Public Hearings, April 17, 2009, Washington, DC.

“Protecting and Commercializing New Ideas”, CoreNet Global Chicago Chapter Meeting, Chicago, May 13, 2009.

“The Future of the IP Marketplace”, Moderator and Plenary Speaker, IP Markets 2009, Chicago, July 23, 2009.

“Staying Ahead of the Curve – Strategic Intelligence, Value Assessments and Monetization in a Highly Competitive Economy”, The 6<sup>th</sup> Annual Patents & The Financial Services Industry Conference, New York City, July 28-29, 2009.

“Helping Companies in a Down Economy: Strategic Planning for Identifying and Valuing Your IP”, American Bar Association Annual Meeting, Chicago, July 31, 2009.





“Managing IP During Uncertain Times”, NanoBusiness Alliance Conference, Chicago, September 8, 2010.

National Economic Framework for Intellectual Property Based Commerce, A Research Report by the National Knowledge & Intellectual Property Management Taskforce, Net Worth Press, 2009.

“The Role of IP in Tough Economic Times and How to Use it to Your Advantage: Corporate Recovery and Restructuring”, Licensing Executives Society Annual Meeting, San Francisco, October 19, 2009.

“Global IP Market Development”, 11<sup>th</sup> Annual Utah IP Summit, Salt Lake City, February 13, 2010.

“Law, Economics, Business and Policy Implications for Innovation and Competition of Diverse Business Models for Using Patents”, Stanford University Hoover Institution Annual Conference, Stanford, California, June 25, 2010.

“Establishing an Objective Value of IP”, IPO Annual Meeting, Atlanta, September 14, 2010.

“Intellectual Property and the Marketplace: Hot Topics Impacting the Role of Patents, Trademarks and Copyrights in Today’s Business World”, Vedder Price Illinois Continuing Legal Education Forum, Chicago, October 6, 2010.

“IP Essentials for the Chief Executive Officer”, Illinois Technology Association, Chairman’s Dinner Keynote Speaker, Chicago, October 20, 2010.

“Valuation of IP in Emerging Market Platforms”, 2010 IP Damages Institute, CalCPA Education Foundation, Los Angeles, November 8, 2010.

“Shifting Sands: What is Discoverable and Admissible for Damages, Willfulness and Other Purposes”, Intellectual Property Owners Association CLE Roundtable, Washington, DC, March 21, 2011.

“Intellectual Property: From Asset to Asset Class”, Intellectual Property Strategies for the 21<sup>st</sup> Century Corporation, Bryer, Lebson & Asbell Editors, John Wiley & Sons, Inc., 2011.

“The Next Big Think in Monetizing IP: A Natural Progression to Exchange-Traded Units”, Ian D. McClure co-author, *LANDSLIDE*, A Publication of the ABA Section of Intellectual Property Law, Volume 3, Number 5, May/June 2011, pp. 32-37.

“Risk Management Strategies to Defend Against Patent Trolls and the New Trend in Patent Royalty Trusts”, 2011 Congress on Patent Strategies for the Financial Services Industry, New York, September 19-20, 2011.

“Patent Quality and its Impact on Valuation”, Licensing Executives Society United States and Canada, Inc., Annual Meeting, San Diego, October 17, 2011.



Introduction, “LESI Global Technology Impact Forum (GTIF) Creates Tech Transfer Platform”, *les Nouvelles*, Journal of the Licensing Executives Society International, Volume XLVII No. 2, June 2012.

Panelist, “IP Monetization”, McDermott Will & Emery 2012 Intellectual Property Symposium, Chicago, June 14, 2012.

Keynote Address, Northwestern Law Fifth Annual Conference on Entrepreneurship and Innovation, Chicago, June 14, 2012.

“IP Market Development”, 38<sup>th</sup> Annual Intellectual Property Law Summer Institute, Sponsored by the Intellectual Property Law Section of the State Bar of Michigan, Traverse City, Michigan, July 21, 2012.

“An Investors’ Perspective on IP”, CenterForce IP Strategy Summit, New York City, New York, November 13, 2012.

“Investing in IP”, DealFlow Media Webinar, January 10, 2013.

“Evolving IP Marketplace”, American Intellectual Property Law Association, Mid-Winter Meeting, Tampa, Florida, February 1, 2013. Includes paper: *New Emphasis on the Analytical Approach of Apportionment In Determination of a Reasonable Royalty* by James E. Malackowski, Justin Lewis and Robert Mazur.

“An Inventor’s Walk Down Wall Street”, PatCon 3 at Illinois Institute of Technology Chicago-Kent School of Law, Chicago, April 12, 2013.

*Report on Judge Rader Comments at the 2013 LESI Annual Conference*, LES Global News, Vol. XLVIII No. 2, June 2013.

“Strategic Insights”, Plenary Panel Discussion, IPBC 2013, IP Business Congress, Boston, June 9, 2013.

“IP and Antitrust”, Panel Discussion, McDermott 2013 IP Symposium, June 13, 2013, Chicago.

*IP Investments and Markets* Presented by the Center for Applied Innovation, Panelist on IP Marketplace, Chicago, June 25-26, 2013.

*Capturing Innovation*, Irish Entrepreneurs: An Affiliate Group of the Notre Dame Club of Chicago, Chicago, September 5, 2013.

*Preventing the Napsterization of 3D Printing: Areas for Industry Collaboration and Transparency*, Inside 3D Printing Conference and Expo, San Jose, California, September 18, 2013.

*The Latest Thinking about Non-Practicing Entities*, 2013 AIPLA Annual Meeting, Washington, DC, October 25, 2013.



*Challenges and Opportunities in Asia*, Think Asia, Think Hong Kong: IP, Technology & China/U.S. Opportunities, The Hong Kong Business Association of the Midwest, Chicago, November 19, 2013.

*Rationalizing Remedies*, The 2013 Patent Institute presented by Cravath Swain & Moore, New York, December 5, 2013.

*Special Address: Looking to the Future of the Intellectual Property Marketplace – Where Will We Be in 2020?*, Best Practices in Patent Monetization, Law Seminars International, San Francisco, March 6-7, 2014.

*Reinventing Finance: Funding Innovation Beyond Silicon Valley*, Forbes Reinventing America Summit, Chicago, March 27-28, 2014.

*IP Pricing – Current Issues for Markets and Courts*, Georgia State University / Licensing Executives Society Joint Meeting, Atlanta, May 28, 2014.

*The Growing Global 3DP IP Market & How Much Is At Stake*, 3D Printing Politics, Washington D.C., September 17, 2014.

*The Changing Role of the Expert*, 2014 IP Institute presented by the Engleberg Center on Innovation Law & Policy at New York University and Cravath, Swaine & Moore, LLP, New York, December 4, 2104.

“Intellectual Property Exchange”, Dallas Chapter Meeting of the Licensing Executives Society (USA & Canada), Inc., Dallas, January 22, 2015.

“Actavis, Valuation, and Fairness Opinions”, 2015 Generic Pharmaceutical Association Annual Meeting, Miami, February 9-11, 2015.

Patent Damages Roundtable, USC Gould School of Law 2015 Intellectual Property Institute, Los Angeles, March 23, 2015.

“Intellectual Property Impact on M&A”, Transaction Advisors Midwest Symposium, Chicago, September 17, 2015

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**INTERNATIONAL  
SPEECHES AND  
PUBLICATIONS**

“Taxation Issues when Licensing with the U.S.”, Licensing Executives Society International, South Africa Conference, January 28, 1996.

“Intellectual Property Damages: Advanced Case Studies”, Licensing Executives Society Annual Meeting, Puerto Rico, September 30, 1996.

“License Agreement Royalty Audits: Untapped Riches Or Fool's Gold?”, Licensing Executives Society Annual Meeting, Puerto Rico, October 1, 1996

“Valuation of IPR”, Conference on Appeals Related to Intellectual Property, Bucharest, Romania, November 20, 1997.



“Avaliacao e Contabilizacao de Propriedade Intellectual – Metodologia e Aspectos Fiscais”, XIX Seminario Nacional de Propriedade Intellectual, Rio de Janeiro, Brazil, August 16, 1999.

“Avaliacao e Contabilizacao de Propriedade Intellectual”, Conferencia pela Consulate General of the United States of America, Sao Paulo, Brazil, August 18, 1999.

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United States District Court for the Central District of California  
Deposition Testimony

Keurig, Inc. v. Kraft Foods Global, Inc., Tassimo Corp., and Kraft Foods Inc.  
C.A. No. 07-17 (GMS)  
United States District Court for the District of Delaware  
Deposition Testimony

Leo Pharma A/S v. Tolmar, Inc. et al.  
United States District Court for District of Delaware  
C.A. No. 10-269 (SLR)  
Deposition Testimony



Lincoln Electric Company, et al. v. National Standard, LLC  
No. 1:09-cv-01886-DCN  
United States District Court of Ohio Eastern Division  
Deposition Testimony

LNP Engineering Plastics, Inc. and Kawasaki Chemical Holding Co., Inc. v.  
Miller Waste Mills, Inc. trading as RTP Company  
Civil Action No. 96-462 (RRM)  
United States District Court for the District of Delaware  
Trial Testimony

Lucent Technologies Inc. v. Extreme Networks, Inc.  
Civil Action No. 03-508 (JJF)  
United States District Court for the District of Delaware  
Trial and Deposition Testimony

Lunar Corp. & The UAB Research Foundation v. EG&G Astrophysics Research  
Corp.  
Civil Action No. 96-C-199-S  
Trial Testimony

Matsushita Electric Industrial Co., Ltd. v. MediaTek, Inc., Oppo Digital., and  
Micro-Star International Computer Corp.  
Case No. C05-03148 MMC  
United States District Court for the Northern District of California San  
Francisco Division  
Deposition Testimony

McKinley v. Zdeb  
Civil Action No. 99-S-1178  
United States District Court for the District of Colorado  
Fact Deposition Testimony

Medgraph, Inc. v. Medtronic, Inc.  
Case No. 6:09-cv-06610-DGL-MWP  
United States District Court for the Western District of New York  
Rochester Division  
Deposition Testimony

Medtronic Xomed, Inc. v. Gryus ENT LLC  
Case No.: 3:04CV400-J-32 MCR  
United States District Court for the Middle District of Florida  
Jacksonville Division  
Deposition Testimony

MEI, Inc. v. JCM American Corp & Japan Cash Machine Co. Ltd.  
United States District Court for the District of New Jersey  
Civil Action No. 09-00351  
Deposition Testimony

Message Phone, Inc. v. SVI Systems, Inc. and Tharaldson Properties



Civil Action No. 379CV-1813H  
Trial Testimony

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Case No. CV 08-0457 DOC (RNBx)  
United States District Court for the Central District of California Southern Division  
Deposition Testimony

Military Professional Services, Inc. v. BancOhio National Bank  
Civil Action No. 91-5032  
Deposition Testimony

Minebea Co., Ltd., Precision Motors Deutsche Minebea GmbH, and Nippon Miniature Bearing Corp. v. George Papst, Papst Licensing GmbH, and Papst Licensing Verwaltungsgesellschaft MIT Beschränkter Haftung  
Civil Action No. 97-CV-590 (PLF)  
Trial and Deposition Testimony

Mitek Surgical Products, Inc. v. Arthrex, Inc.  
Case No. 1:96CV 0087S  
United States District Court for the District of Utah, Central Division  
Deposition Testimony

Mitsubishi Electric Corp., Koninklijke Philips N.V., Thomson Licensing, GE Technology Development, Inc. Panasonic Corporation and Sony Corporation v. Sceptre, Inc.  
Case No. 2:14-cv-04994-ODW-AJW  
United States District Court for the Central District of California  
Deposition Testimony

Money Suite Company v. Insurance Answer Center, LLC; Answer Financial, Inc.; AllState Insurance Company; Esurance Insurance Services, Inc.  
United States District Court Central District of California Southern Division  
Deposition Testimony

Motorola, Inc. v. InterDigital Technology Corporation  
Civil Action No. 93-488  
United States District Court for the District of Delaware  
Trial and Deposition Testimony

Nellcor Puritan Bennett, LLC v. CAS Medical Systems, Inc.  
Case No. 2:11-CV-15697  
United States District Court for the Eastern District of Michigan Southern Division  
Deposition Testimony

Netlist, Inc. v. Diablo Technologies, Inc.  
Civil Action No. 4:13-CV-05962-YGR



United States District Court for the Central District of California Oakland  
Division  
Trial Testimony

Nomadix, Inc. v. Hewlett-Packard Company, et al.  
Civil Action No. CV09-08441 DDP(VBKx)  
United States District Court for the Central District of California Western  
Division  
Deposition Testimony

Nomix Corporation v. Quikrete Companies, Inc.  
Civil Action No. H88-463-AHN  
Trial and Deposition Testimony

Orthofix, Inc., et al v. EBI Medical Systems, Inc., et al.  
Civil Action No. 95-6035 (SMO)  
United States District Court for the District of New Jersey  
Trial and Deposition Testimony

Pharmacia & Upjohn Company, LLC v. Sicor Inc. and Sicor Pharmaceuticals,  
Inc.  
Civil Action No. 04-833 (KAJ)  
United States District Court for the District of Delaware  
Deposition Testimony

Picker International, Inc. v. Mayo Foundation, et al.  
Case No. 95-CV-2028  
United States District Court for the Northern District of Ohio, Eastern Division  
Trial and Deposition Testimony

Penda Corporation v. United States of America and Cadillac Products, Inc.  
Case No. 473-89-C  
United States Court of Federal Claims  
Trial and Deposition Testimony

Peter Daou and James Boyce v. Arianna Huffington, Kenneth Lerer and  
TheHuffingtonPost.com, Inc.  
Index No. 651997/2010  
Supreme Court of the State of New York, County of New York  
Deposition Testimony

Power Integrations, Inc. v. Fairchild Semiconductor International, Inc., Fairchild  
Semiconductor Corporation and System General Corporation  
Case No. 3:09-cv-05235-MMC  
United States District Court for the Northern District of California  
Trial and Deposition Testimony

Powertech Technology, Inc. v. Tessera, Inc.  
Case No. CV10-00945EMC  
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Deposition Testimony





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Technology Materials, Inc.  
Civil Action No. 03-1158-SLR  
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Deposition Testimony

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Civil Action No. 8:12-cv-122-LES-TDT  
United States District Court of Nebraska  
Deposition Testimony

Prism Technologies, LLC v. T-Mobile USA, Inc.  
Civil Action No. 8:12-cv-00124  
United States District Court of Nebraska  
Trial and Deposition Testimony

Prism Technologies, LLC v. Sprint Spectrum L.P. d/b/a/ Sprint PCS  
Civil Action No. 8:12-cv-123-LES-TDT  
United States District Court of Nebraska  
Trial and Deposition Testimony

The Procter & Gamble Company v. Paragon Trade Brands, Inc.  
Civil Action No. 94-16-LON  
United States District Court for the District of Delaware  
Trial and Deposition Testimony

QR Spex, Inc. and Thomas G. Swab v. Motorola, Inc. and Frog Design, Inc.  
Civil Action No 03-6284 JFW (FMOx)  
United States District Court for the Central District of California  
Deposition Testimony

Qualcomm, Inc. v. InterDigital Communications Corporation  
Case No. 93-1091G (LSP)  
Deposition Testimony

Quickie, LLC v. Medtronic, Inc.  
Civil Action No. 02 CV 1157 (GEL)  
United States District Court for the Southern District of New York  
Deposition Testimony

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Civil Action No. 5:13-cv-02024 RMW  
United States District Court for the Southern District of California San Jose  
Division  
Deposition Testimony

Remcor v. Scotsman/Booth  
Civil Action No. 93 C 1822  
United States District Court for the Northern District of Illinois, Eastern  
Division  
Deposition Testimony



Remcor v. Servend  
Civil Action No. 93 C 1823  
United States District Court for the Northern District of Illinois, Eastern  
Division  
Deposition Testimony

Rensselaer Polytechnic Institute and Dynamic Advances, LLC v. Apple Inc.  
Case No 1:13-cv-00633 (DNH/DEP)  
United States District Court for the Northern District of New York  
Deposition Testimony

Research Corporation Technologies, Inc. v. Hewlett-Packard Company  
Civil Action No. CIV 95-490-TUC-JMR  
United States District Court for the District of Arizona  
Deposition Testimony

Rommy Hunt Revson v. The Limited, Inc. et al.  
Civil Action No. 90-3840 (MGC)  
Deposition Testimony

Ronald A. Katz Technology Licensing, LP v. Ameren Corporation; Union  
Electric Company; Central Illinois Public Service Company; Cilcorp, Inc.;  
Central Illinois Light Company  
Case No. 07-4955 RGK (FFMx)  
United States District Court for the Central District of California  
Deposition Testimony

Ronald A. Katz Technology Licensing, LP v. AOL, LLC, CompuServe  
Interactive Services and Netscape Communications Corporation  
CV 07-2134 RGK (FFMx)  
United States District Court for the Central District of California  
Deposition Testimony

Ronald A. Katz Technology Licensing, LP v. Cablevision Systems Corporation  
et. al.  
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Deposition Testimony

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Charter Communications Holding Company, LLC; Charter Communications  
Operating, LLC; and Charter Communications Entertainment I, LLC  
CV 07-2134 RGK (FFMx)  
United States District Court for the Central District of California  
Deposition Testimony

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Health Corporation, CIGNA HealthCare of Delaware, Inc., Tel-Drug of  
Pennsylvania, LLC and Tel-Drug, Inc.  
CV 07-2192 RGK (FFMx)  
United States District Court for the Central District of California  
Deposition Testimony



Ronald A. Katz Technology Licensing, LP v. Comcast Corporation, Sirius-XM Radio, Inc., et al.

NO. 2:07-ML-01816-C RGK (FFMx)

United States District Court for the Central District of California

Deposition Testimony

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United States District Court for the Central District of California

Deposition Testimony

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Case No. 07-4960 RGK (FFMx)

United States District Court for the Central District of California

Deposition Testimony

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United States District Court for the Central District of California

Deposition Testimony

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Case No.07-ML-01816-B-RGK (FFMX)

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Deposition Testimony

Rosetta Stone Ltd. v. Google Inc.

Civil Action No. 1:09 CV 736 GBL / JFA

United States District Court for the Eastern District of Virginia

Deposition Testimony

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Case No. SA-96-CA-603-OG

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Trial Testimony

Saxon Innovations, LLC v. Nokia Corp, et al. (including Samsung Electronics, Co. and related parties)

Civil Action No. 6:07-cv-490-LED-JDL

United States District Court for the Eastern District of Texas Tyler Division

Deposition Testimony

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Deposition Testimony

Silicon Image, Inc. v. Analogix Semiconductor, Inc.  
Case No. C 07-00635 JCS  
United States District Court for the Northern District of California, San  
Francisco Division  
Deposition Testimony

Site Microsurgical Systems v. The Cooper Companies  
Civil Action S92-766  
Deposition Testimony

SmartPhone Technologies, LLC v. Research In Motion Corp. et. al (on behalf  
LG Electronics, Inc. and LG Electronics USA, Inc.)  
Civil Action No. 6:10cv74-LED  
United States District Court Eastern District of Texas Tyler Division  
Deposition Testimony

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Photo Film U.S.A., Inc., Fujifilm America, Inc., et al.  
Civil Action No. 03-241 JJF  
United States District Court for the District of Delaware  
Trial and Deposition Testimony

STMicroelectronics, Inc. v. SanDisk Corp.  
C.A. No. 4:05CV44  
United States District Court of Texas Sherman Division  
Deposition Testimony

STMicroelectronics, Inc. v. SanDisk Corp.  
C.A. No. 4:05CV45  
United States District Court of Texas Sherman Division  
Deposition Testimony

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Civil Action CV-95-1750  
Deposition Testimony

Technol Medical Products, Inc., et al v. Robert Busse & Co., Inc.  
Civil Action No. 3:94-CV-2284-X  
Deposition Testimony

Tekmira Pharmaceuticals Corporation and Protiva Pharmaceuticals, Inc. v.  
Alnylam Pharmaceuticals, Inc. and AlCana Technologies, Inc.  
Civil Action No. 11-1010-BLS2  
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Deposition Testimony

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United States District Court for Northern District of California Oakland Division  
Deposition Testimony

Tessera, Inc. v. UTAC (Taiwan) Corporation  
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Division  
Deposition Testimony

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Civil Action No. 95-CV-75534-DT  
Deposition Testimony

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Cadet LLC  
Civil Action No 10-cv-007-JNE-TNL  
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Deposition Testimony

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CaptionCall, LLC  
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Trial and Deposition Testimony

Unwired Planet, LLC v. Apple, Inc.  
Case No. 3:13-cv-4134-VC  
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Francisco Division  
Deposition Testimony

Valmet Paper Machinery, Inc. and Valmet-Charlotte, Inc. v. Beloit Corporation  
Civil Action No. 93-C-587-C  
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Trial and Deposition Testimony

Verinata Health, Inc. and the Board of Trustees of the Leland Stanford Junior  
University v. Sequenom, Inc. and Sequenom Center for Molecular Medicine,  
LLC.  
Case No. 3:12-cv-00865-SI  
Deposition Testimony

Volterra Semiconductor Corporation v. Primarion, Inc., Infineon Technologies  
AG and Infineon Technologies North America Corporation  
Case No. C 08-05129 CRB  
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Francisco Division  
Deposition Testimony

Wang Laboratories, Inc. v. America Online, Inc. and Netscape Communications  
Corporation  
Civil Action No. 97-1628-A



United States District Court for the Eastern District of Virginia  
Deposition Testimony

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Waukesha Cherry-Burrell v. Wrightech Corporation  
Civil Action No. 96-CV-00384  
Deposition Testimony

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the Trustees of Columbia University in the City of New York v. Sceptre, Inc.  
Case No. 9:13-CV-80567  
United States District Court for the Central District of California  
Deposition Testimony

Zenith Electronics LLC v. Vizio, Inc.; Westinghouse Digital Electronics LLC, et  
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Oracle America, Inc. v. Google, Inc.

**DOCUMENTS CONSIDERED**

Exhibit 2

I was provided with access to a Relativity database of materials produced in this case. I reviewed the documents provided therein through keyword searches. The following list contains many of the documents I reviewed in that database, as well as other documents provided to me by counsel, though it should not be considered comprehensive.

**Documents Produced by Google**

|                               |                               |                               |                               |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| GOOG-00022379                 | GOOG-00132535                 | GOOG-00147537 - GOOG-00147538 | GOOG-00147618                 |
| GOOG-00022380                 | GOOG-00132625                 | GOOG-00147539                 | GOOG-00147619                 |
| GOOG-00022381                 | GOOG-00132648                 | GOOG-00147542                 | GOOG-00147620                 |
| GOOG-00022382                 | GOOG-00132649 - GOOG-00132663 | GOOG-00147545                 | GOOG-00147621                 |
| GOOG-00022383                 | GOOG-00132664 - GOOG-00132680 | GOOG-00147546                 | GOOG-00147622                 |
| GOOG-00022384                 | GOOG-00132945 - GOOG-00132946 | GOOG-00147547                 | GOOG-00147623                 |
| GOOG-00022385                 | GOOG-00132947                 | GOOG-00147548                 | GOOG-00147624                 |
| GOOG-00022386                 | GOOG-00132948                 | GOOG-00147549 - GOOG-00147553 | GOOG-00147625                 |
| GOOG-00022387                 | GOOG-00132949                 | GOOG-00147554                 | GOOG-00147626                 |
| GOOG-00022388                 | GOOG-00132950                 | GOOG-00147555                 | GOOG-00147627                 |
| GOOG-00100278 - GOOG-00100300 | GOOG-00132951                 | GOOG-00147556                 | GOOG-00147628                 |
| GOOG-00100278 - GOOG-00100301 | GOOG-00132952                 | GOOG-00147557                 | GOOG-00147630 - GOOG-00147631 |
| GOOG-00100302 - GOOG-00100310 | GOOG-00132953                 | GOOG-00147558                 | GOOG-00147632                 |
| GOOG-00100302 - GOOG-00100311 | GOOG-00132954                 | GOOG-00147559                 | GOOG-00147633                 |
| GOOG-00100312 - GOOG-00100330 | GOOG-00132955 - GOOG-00132984 | GOOG-00147560 - GOOG-00147568 | GOOG-00147634                 |
| GOOG-00100331 - GOOG-00100362 | GOOG-00132985                 | GOOG-00147570                 | GOOG-00147635                 |
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| GOOG-00100388                 | GOOG-00133825 - GOOG-00133856 | GOOG-00147572                 | GOOG-00147637 - GOOG-00147641 |
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| GOOG-00100390                 | GOOG-00133858                 | GOOG-00147576                 | GOOG-00147643                 |
| GOOG-00100391 - GOOG-00100408 | GOOG-00133879                 | GOOG-00147577                 | GOOG-00147644 - GOOG-00147647 |
| GOOG-00100409 - GOOG-00100432 | GOOG-00133880 - GOOG-00133930 | GOOG-00147578 - GOOG-00147580 | GOOG-00147648                 |
| GOOG-00100518 - GOOG-00100523 | GOOG-00133931 - GOOG-00133975 | GOOG-00147581                 | GOOG-00147649                 |
| GOOG-00100569 - GOOG-00100589 | GOOG-00137821 - GOOG-00137823 | GOOG-00147583                 | GOOG-00147650                 |
| GOOG-00101618 - GOOG-00101625 | GOOG-00138124 - GOOG-00138131 | GOOG-00147584                 | GOOG-00147651                 |
| GOOG-00101735 - GOOG-00101739 | GOOG-00147485                 | GOOG-00147585                 | GOOG-00147654                 |
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| GOOG-00103813                 | GOOG-00147489                 | GOOG-00147588 - GOOG-00147590 | GOOG-00147659 - GOOG-00147677 |
| GOOG-00103814                 | GOOG-00147490                 | GOOG-00147591                 | GOOG-00147678                 |
| GOOG-00103815                 | GOOG-00147491 - GOOG-00147494 | GOOG-00147593                 | GOOG-00147679 - GOOG-00147684 |
| GOOG-00103816                 | GOOG-00147498 - GOOG-00147499 | GOOG-00147596                 | GOOG-00147685                 |
| GOOG-00104049 - GOOG-00104050 | GOOG-00147500 - GOOG-00147503 | GOOG-00147597                 | GOOG-00147686 - GOOG-00147688 |
| GOOG-00104227 - GOOG-00104252 | GOOG-00147504                 | GOOG-00147598                 | GOOG-00147689                 |
| GOOG-00104442 - GOOG-00104480 | GOOG-00147505 - GOOG-00147508 | GOOG-00147599                 | GOOG-00147690                 |
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| GOOG-00130302                 | GOOG-00147510                 | GOOG-00147601                 | GOOG-00147692                 |
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| GOOG-00130683 - GOOG-00130691 | GOOG-00147514                 | GOOG-00147603 - GOOG-00147605 | GOOG-00147694                 |
| GOOG-00130741 - GOOG-00130743 | GOOG-00147515                 | GOOG-00147606                 | GOOG-00147695                 |
| GOOG-00130744 - GOOG-00130745 | GOOG-00147517                 | GOOG-00147607                 | GOOG-00147696                 |
| GOOG-00130997 - GOOG-00131001 | GOOG-00147518 - GOOG-00147521 | GOOG-00147608                 | GOOG-00147697                 |
| GOOG-00131217 - GOOG-00131253 | GOOG-00147523                 | GOOG-00147609                 | GOOG-00147698 - GOOG-00147704 |
| GOOG-00131428 - GOOG-00131461 | GOOG-00147524                 | GOOG-00147610                 | GOOG-00147705                 |
| GOOG-00132217                 | GOOG-00147525 - GOOG-00147529 | GOOG-00147611                 | GOOG-00147706 - GOOG-00147707 |
| GOOG-00132218 - GOOG-00132244 | GOOG-00147532                 | GOOG-00147612                 | GOOG-00147708                 |
| GOOG-00132245 - GOOG-00132266 | GOOG-00147533                 | GOOG-00147613                 | GOOG-00147709 - GOOG-00147710 |
| GOOG-00132501 - GOOG-00132507 | GOOG-00147535                 | GOOG-00147614                 | GOOG-00147711                 |
| GOOG-00132508 - GOOG-00132534 | GOOG-00147536                 | GOOG-00147615 - GOOG-00147617 | GOOG-00147712 - GOOG-00147720 |

Oracle America, Inc. v. Google, Inc.

**DOCUMENTS CONSIDERED**

Exhibit 2

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**Documents Produced by Google**

|                               |                               |                               |                               |
|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| GOOG-00147721                 | GOOG-00147807                 | GOOG-00147871                 | GOOG-00147930                 |
| GOOG-00147723                 | GOOG-00147808                 | GOOG-00147872                 | GOOG-00147931                 |
| GOOG-00147724                 | GOOG-00147809                 | GOOG-00147873                 | GOOG-00147932                 |
| GOOG-00147725                 | GOOG-00147810                 | GOOG-00147875                 | GOOG-00147933                 |
| GOOG-00147726                 | GOOG-00147811                 | GOOG-00147876                 | GOOG-00147934                 |
| GOOG-00147727                 | GOOG-00147812                 | GOOG-00147877                 | GOOG-00147935                 |
| GOOG-00147728                 | GOOG-00147814                 | GOOG-00147878                 | GOOG-00147936 - GOOG-00147937 |
| GOOG-00147729                 | GOOG-00147815                 | GOOG-00147879                 | GOOG-00147938                 |
| GOOG-00147730 - GOOG-00147731 | GOOG-00147816                 | GOOG-00147880                 | GOOG-00147939                 |
| GOOG-00147732 - GOOG-00147733 | GOOG-00147817                 | GOOG-00147881                 | GOOG-00147940                 |
| GOOG-00147734 - GOOG-00147735 | GOOG-00147818                 | GOOG-00147882 - GOOG-00147884 | GOOG-00147941 - GOOG-00147943 |
| GOOG-00147736                 | GOOG-00147819                 | GOOG-00147885 - GOOG-00147886 | GOOG-00147944                 |
| GOOG-00147737                 | GOOG-00147821                 | GOOG-00147887                 | GOOG-00153871 - GOOG-00153889 |
| GOOG-00147738                 | GOOG-00147822                 | GOOG-00147888                 | GOOG-00185632 - GOOG-00185653 |
| GOOG-00147739                 | GOOG-00147823                 | GOOG-00147889                 | GOOG-00186606                 |
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| GOOG-00147742                 | GOOG-00147826                 | GOOG-00147894                 | GOOG-00186751                 |
| GOOG-00147743                 | GOOG-00147828                 | GOOG-00147895                 | GOOG-00186863 - GOOG-00186873 |
| GOOG-00147744                 | GOOG-00147829                 | GOOG-00147896                 | GOOG-00186877 - GOOG-00186891 |
| GOOG-00147745                 | GOOG-00147830                 | GOOG-00147897                 | GOOG-00187625                 |
| GOOG-00147746 - GOOG-00147747 | GOOG-00147831                 | GOOG-00147898                 | GOOG-00188159                 |
| GOOG-00147748                 | GOOG-00147832                 | GOOG-00147899                 | GOOG-00188797                 |
| GOOG-00147749 - GOOG-00147755 | GOOG-00147834                 | GOOG-00147900                 | GOOG-00188959                 |
| GOOG-00147756 - GOOG-00147762 | GOOG-00147835                 | GOOG-00147901 - GOOG-00147902 | GOOG-00188962                 |
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| GOOG-00147770 - GOOG-00147776 | GOOG-00147839                 | GOOG-00147904                 | GOOG-00199349                 |
| GOOG-00147777                 | GOOG-00147840                 | GOOG-00147905                 | GOOG-00209729 - GOOG-00209753 |
| GOOG-00147779 - GOOG-00147780 | GOOG-00147841                 | GOOG-00147906                 | GOOG-00209729 - GOOG-00209754 |
| GOOG-00147781                 | GOOG-00147842                 | GOOG-00147907                 | GOOG-00209915 - GOOG-00209966 |
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| GOOG-00147784                 | GOOG-00147846                 | GOOG-00147910                 | GOOG-00213694 - GOOG-00213723 |
| GOOG-00147785                 | GOOG-00147847                 | GOOG-00147911                 | GOOG-00216972 - GOOG-00217047 |
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| GOOG-00147789                 | GOOG-00147852                 | GOOG-00147915                 | GOOG-00228774 - GOOG-00228778 |
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| GOOG-00147791 - GOOG-00147792 | GOOG-00147855                 | GOOG-00147919                 | GOOG-00231200 - GOOG-00231208 |
| GOOG-00147793                 | GOOG-00147859                 | GOOG-00147920                 | GOOG-00250358 - GOOG-00250359 |
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| GOOG-00147795                 | GOOG-00147861                 | GOOG-00147922                 | GOOG-00268939 - GOOG-00268959 |
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| GOOG-00147800                 | GOOG-00147864                 | GOOG-00147925                 | GOOG-00272276 - GOOG-00272298 |
| GOOG-00147801                 | GOOG-00147865                 | GOOG-00147926                 | GOOG-00272299 - GOOG-00272321 |
| GOOG-00147803                 | GOOG-00147866                 | GOOG-00147927                 | GOOG-00272457                 |
| GOOG-00147805                 | GOOG-00147867 - GOOG-00147868 | GOOG-00147928                 | GOOG-00273854 - GOOG-00273874 |
| GOOG-00147806                 | GOOG-00147869                 | GOOG-00147929                 | GOOG-00275390 - GOOG-00275410 |

Oracle America, Inc. v. Google, Inc.

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|                               |                               |                               |   |
|-------------------------------|-------------------------------|-------------------------------|---|
| GOOG-00276658 - GOOG-00276675 | GOOG-10000068 - GOOG-10000073 | GOOG-10000600 - GOOG-10000603 | GOOG-10001081 - GOOG-10001093           |
| GOOG-00277550 - GOOG-00277585 | GOOG-10000074 - GOOG-10000077 | GOOG-10000604 - GOOG-10000615 | GOOG-10001094 - GOOG-10001096           |
| GOOG-00278535 - GOOG-00278536 | GOOG-10000078 - GOOG-10000093 | GOOG-10000616 - GOOG-10000630 | GOOG-10001097 - GOOG-10001114           |
| GOOG-00278537 - GOOG-00278586 | GOOG-10000094 - GOOG-10000105 | GOOG-10000631 - GOOG-10000634 | GOOG-10001115 - GOOG-10001123           |
| GOOG-00278858                 | GOOG-10000106 - GOOG-10000118 | GOOG-10000635 - GOOG-10000638 | GOOG-10001124 - GOOG-10001191           |
| GOOG-00278859 - GOOG-00278882 | GOOG-10000119 - GOOG-10000132 | GOOG-10000639 - GOOG-10000641 | GOOG-10001192 - GOOG-10001267           |
| GOOG-00281674 - GOOG-00281677 | GOOG-10000133 - GOOG-10000148 | GOOG-10000642 - GOOG-10000651 | GOOG-10001268 - GOOG-10001338           |
| GOOG-00283376                 | GOOG-10000149 - GOOG-10000152 | GOOG-10000652 - GOOG-10000655 | GOOG-10001339 - GOOG-10001411           |
| GOOG-00283627 - GOOG-00283629 | GOOG-10000153 - GOOG-10000163 | GOOG-10000656 - GOOG-10000658 | GOOG-10001412 - GOOG-10001421           |
| GOOG-00284863                 | GOOG-10000164 - GOOG-10000168 | GOOG-10000659 - GOOG-10000676 | GOOG-10001422 - GOOG-10001431           |
| GOOG-00284864 - GOOG-00284885 | GOOG-10000169 - GOOG-10000175 | GOOG-10000677 - GOOG-10000696 | GOOG-10001432 - GOOG-10001446           |
| GOOG-00290796 - GOOG-00290928 | GOOG-10000176 - GOOG-10000203 | GOOG-10000697 - GOOG-10000715 | GOOG-10001447 - GOOG-10001468           |
| GOOG-00291451 - GOOG-00291454 | GOOG-10000204 - GOOG-10000206 | GOOG-10000716 - GOOG-10000733 | GOOG-10001469 - GOOG-10001488           |
| GOOG-00321589 - GOOG-00321591 | GOOG-10000207 - GOOG-10000216 | GOOG-10000734 - GOOG-10000737 | GOOG-10001489 - GOOG-10001510           |
| GOOG-00338296 - GOOG-00338297 | GOOG-10000217 - GOOG-10000229 | GOOG-10000738 - GOOG-10000755 | GOOG-10001511 - GOOG-10001524           |
| GOOG-00347724 - GOOG-00347739 | GOOG-10000230 - GOOG-10000232 | GOOG-10000756 - GOOG-10000773 | GOOGLE_SCAN189873                       |
| GOOG-00360213 - GOOG-00360259 | GOOG-10000233 - GOOG-10000244 | GOOG-10000774 - GOOG-10000785 | GOOGLE-00-00000001                      |
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| GOOG-00371968 - GOOG-00371969 | GOOG-10000249 - GOOG-10000268 | GOOG-10000789 - GOOG-10000800 | GOOGLE-00-00000003                      |
| GOOG-00373749 - GOOG-00373753 | GOOG-10000269 - GOOG-10000281 | GOOG-10000801 - GOOG-10000815 | GOOGLE-00-00000004                      |
| GOOG-00376192 - GOOG-00376193 | GOOG-10000282 - GOOG-10000285 | GOOG-10000816 - GOOG-10000819 | GOOGLE-00-00000005                      |
| GOOG-00377104                 | GOOG-10000286 - GOOG-10000288 | GOOG-10000820 - GOOG-10000822 | GOOGLE-00-00000006                      |
| GOOG-00377185 - GOOG-00377197 | GOOG-10000289 - GOOG-10000290 | GOOG-10000823 - GOOG-10000833 | GOOGLE-00-00000007                      |
| GOOG-00378110 - GOOG-00378111 | GOOG-10000291 - GOOG-10000308 | GOOG-10000834 - GOOG-10000848 | GOOGLE-00-00000008                      |
| GOOG-00383830 - GOOG-00383831 | GOOG-10000309 - GOOG-10000311 | GOOG-10000849 - GOOG-10000854 | GOOGLE-00-00000009                      |
| GOOG-00386364 - GOOG-00386365 | GOOG-10000312 - GOOG-10000315 | GOOG-10000855 - GOOG-10000858 | GOOGLE-00-00000010                      |
| GOOG-00387484 - GOOG-00387520 | GOOG-10000316 - GOOG-10000337 | GOOG-10000859 - GOOG-10000875 | GOOGLE-00-00000011                      |
| GOOG-00387521 - GOOG-00387552 | GOOG-10000338 - GOOG-10000349 | GOOG-10000876 - GOOG-10000887 | GOOGLE-00-00000012                      |
| GOOG-00387553 - GOOG-00387591 | GOOG-10000350 - GOOG-10000363 | GOOG-10000888 - GOOG-10000897 | GOOGLE-00-00000013                      |
| GOOG-00388406 - GOOG-00388411 | GOOG-10000364 - GOOG-10000366 | GOOG-10000898 - GOOG-10000916 | GOOGLE-00-00000014                      |
| GOOG-00389652 - GOOG-00389654 | GOOG-10000367 - GOOG-10000387 | GOOG-10000917 - GOOG-10000920 | GOOGLE-00-00000015                      |
| GOOG-00390061 - GOOG-00390087 | GOOG-10000388 - GOOG-10000389 | GOOG-10000921 - GOOG-10000923 | GOOGLE-00-00000016                      |
| GOOG-00526515 - GOOG-00526519 | GOOG-10000390 - GOOG-10000408 | GOOG-10000924 - GOOG-10000926 | GOOGLE-00-00000017                      |
| GOOG-00548436 - GOOG-00548438 | GOOG-10000409 - GOOG-10000429 | GOOG-10000927 - GOOG-10000938 | GOOGLE-00-00000018                      |
| GOOG-00570589 - GOOG-00570729 | GOOG-10000430 - GOOG-10000447 | GOOG-10000939 - GOOG-10000941 | GOOGLE-00-00000019                      |
| GOOG-00570823 - GOOG-00570824 | GOOG-10000448 - GOOG-10000462 | GOOG-10000942 - GOOG-10000953 | GOOGLE-00-00000020                      |
| GOOG-00577366 - GOOG-00577445 | GOOG-10000463 - GOOG-10000466 | GOOG-10000954 - GOOG-10000965 | GOOGLE-00-00000021                      |
| GOOG-00577445 - GOOG-00577367 | GOOG-10000467 - GOOG-10000482 | GOOG-10000966 - GOOG-10000978 | GOOGLE-00-00000022                      |
| GOOG-00580439 - GOOG-00580534 | GOOG-10000483 - GOOG-10000486 | GOOG-10000979 - GOOG-10000990 | GOOGLE-00-00000023                      |
| GOOG-00580946 - GOOG-00580991 | GOOG-10000487 - GOOG-10000501 | GOOG-10000991 - GOOG-10000994 | GOOGLE-00-00000024                      |
| GOOG-10000001 - GOOG-10000019 | GOOG-10000502 - GOOG-10000505 | GOOG-10000995 - GOOG-10001018 | GOOGLE-00-00000025                      |
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| GOOG-10000050 - GOOG-10000053 | GOOG-10000541                 | GOOG-10001038 - GOOG-10001041 | GOOGLE-00-00000028                      |
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| GOOG-10000061 - GOOG-10000063 | GOOG-10000569 - GOOG-10000579 | GOOG-10001058 - GOOG-10001072 | GOOGLE-00-00000031 - GOOGLE-00-00000036 |
| GOOG-10000064 - GOOG-10000067 | GOOG-10000580 - GOOG-10000583 | GOOG-10001073 - GOOG-10001076 | GOOGLE-00-00000037 - GOOGLE-00-00000048 |
| GOOGLE-00-00000060            | GOOG-10000584 - GOOG-10000599 | GOOG-10001077 - GOOG-10001080 | GOOGLE-00-00000049 - GOOGLE-00-00000059 |

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**Documents Produced by Google**

|   |                                   |                                   |                                   |
|---|-----------------------------------|-----------------------------------|-----------------------------------|
| GOOGLE-00-00000061 - GOOGLE-00-00000072 | GOOGLE-00303723                   | GOOGLE-00305054 - GOOGLE-00305057 | GOOGLE-00305171 - GOOGLE-00305174 |
| GOOGLE-00-00000073                      | GOOGLE-00303724                   | GOOGLE-00305058 - GOOGLE-00305059 | GOOGLE-00305175 - GOOGLE-00305189 |
| GOOGLE-00-00000074                      | GOOGLE-00303725 - GOOGLE-00303756 | GOOGLE-00305060 - GOOGLE-00305061 | GOOGLE-00305190 - GOOGLE-00305193 |
| GOOGLE-00-00000075                      | GOOGLE-00303725 - GOOGLE-00303774 | GOOGLE-00305062 - GOOGLE-00305069 | GOOGLE-00305194 - GOOGLE-00305195 |
| GOOGLE-00-00000076                      | GOOGLE-00303725 - GOOGLE-00303775 | GOOGLE-00305070 - GOOGLE-00305071 | GOOGLE-00305196 - GOOGLE-00305197 |
| GOOGLE-00-00000077                      | GOOGLE-00303725 - GOOGLE-00303807 | GOOGLE-00305072 - GOOGLE-00305073 | GOOGLE-00305198 - GOOGLE-00305204 |
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| GOOGLE-00-00000289 - GOOGLE-00-00000348 | GOOGLE-00303758 - GOOGLE-00303773 | GOOGLE-00305076 - GOOGLE-00305077 | GOOGLE-00305206 - GOOGLE-00305208 |
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| GOOGLE-00303105 - GOOGLE-00303109       | GOOGLE-00304105 - GOOGLE-00304124 | GOOGLE-00305136 - GOOGLE-00305137 | GOOGLE-00305301 - GOOGLE-00305302 |
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| GOOGLE-00303709                         | GOOGLE-00304460 - GOOGLE-00304480 | GOOGLE-00305150 - GOOGLE-00305151 | GOOGLE-00305313 - GOOGLE-00305314 |
| GOOGLE-00303710                         | GOOGLE-00304508 - GOOGLE-00304512 | GOOGLE-00305152 - GOOGLE-00305153 | GOOGLE-00305315 - GOOGLE-00305316 |
| GOOGLE-00303711                         | GOOGLE-00304959                   | GOOGLE-00305154 - GOOGLE-00305155 | GOOGLE-00305317 - GOOGLE-00305318 |
| GOOGLE-00303712                         | GOOGLE-00305018 - GOOGLE-00305020 | GOOGLE-00305156 - GOOGLE-00305158 | GOOGLE-00305319 - GOOGLE-00305320 |
| GOOGLE-00303713                         | GOOGLE-00305021                   | GOOGLE-00305159 - GOOGLE-00305160 | GOOGLE-00305321 - GOOGLE-00305322 |
| GOOGLE-00303714                         | GOOGLE-00305022 - GOOGLE-00305029 | GOOGLE-00305161 - GOOGLE-00305162 | GOOGLE-00305323 - GOOGLE-00305324 |
| GOOGLE-00303715                         | GOOGLE-00305030                   | GOOGLE-00305163                   | GOOGLE-00305325 - GOOGLE-00305326 |
| GOOGLE-00303716                         | GOOGLE-00305031 - GOOGLE-00305047 | GOOGLE-00305164                   | GOOGLE-00305327 - GOOGLE-00305328 |
| GOOGLE-00303717 - GOOGLE-00303721       | GOOGLE-00305048 - GOOGLE-00305049 | GOOGLE-00305165 - GOOGLE-00305167 | GOOGLE-00305329 - GOOGLE-00305330 |
| GOOGLE-00303722                         | GOOGLE-00305050 - GOOGLE-00305051 | GOOGLE-00305168 - GOOGLE-00305169 | GOOGLE-00305331 - GOOGLE-00305332 |
| GOOGLE-00392765                         | GOOGLE-00305052 - GOOGLE-00305053 | GOOGLE-00305170                   | GOOGLE-00305333 - GOOGLE-00305334 |

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**Documents Produced by Google**

|                                   |                                   |                                   |                                   |
|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| GOOGLE-00392766 - GOOGLE-00392770 | GOOGLE-00393006 - GOOGLE-00393009 | GOOGLE-00395603                   | GOOGLE-00395901                   |
| GOOGLE-00392771 - GOOGLE-00392774 | GOOGLE-00393010 - GOOGLE-00393013 | GOOGLE-00395604                   | GOOGLE-00395902 - GOOGLE-00395903 |
| GOOGLE-00392775 - GOOGLE-00392778 | GOOGLE-00393014 - GOOGLE-00393018 | GOOGLE-00395605                   | GOOGLE-00395904 - GOOGLE-00395906 |
| GOOGLE-00392779 - GOOGLE-00392782 | GOOGLE-00393019 - GOOGLE-00393022 | GOOGLE-00395606 - GOOGLE-00395612 | GOOGLE-00395907 - GOOGLE-00395908 |
| GOOGLE-00392783 - GOOGLE-00392786 | GOOGLE-00393023 - GOOGLE-00393026 | GOOGLE-00395613                   | GOOGLE-00395909 - GOOGLE-00395913 |
| GOOGLE-00392787 - GOOGLE-00392790 | GOOGLE-00393027 - GOOGLE-00393031 | GOOGLE-00395614                   | GOOGLE-00395914 - GOOGLE-00395918 |
| GOOGLE-00392791 - GOOGLE-00392795 | GOOGLE-00393036 - GOOGLE-00393039 | GOOGLE-00395615                   | GOOGLE-00395919 - GOOGLE-00395940 |
| GOOGLE-00392796 - GOOGLE-00392800 | GOOGLE-00393040 - GOOGLE-00393046 | GOOGLE-00395616                   | GOOGLE-00395941                   |
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| GOOGLE-00392806 - GOOGLE-00392809 | GOOGLE-00393055 - GOOGLE-00393058 | GOOGLE-00395621 - GOOGLE-00395625 | GOOGLE-00395943 - GOOGLE-00395944 |
| GOOGLE-00392810 - GOOGLE-00392813 | GOOGLE-00393059 - GOOGLE-00393063 | GOOGLE-00395626 - GOOGLE-00395629 | GOOGLE-00395945 - GOOGLE-00395949 |
| GOOGLE-00392814 - GOOGLE-00392817 | GOOGLE-00393064 - GOOGLE-00393075 | GOOGLE-00395630 - GOOGLE-00395636 | GOOGLE-00395950 - GOOGLE-00395957 |
| GOOGLE-00392818 - GOOGLE-00392821 | GOOGLE-00393086 - GOOGLE-00393099 | GOOGLE-00395637 - GOOGLE-00395668 | GOOGLE-00395958                   |
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| GOOGLE-00392841 - GOOGLE-00392844 | GOOGLE-00393187 - GOOGLE-00393199 | GOOGLE-00395727 - GOOGLE-00395758 | GOOGLE-00395983                   |
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| GOOGLE-00392849 - GOOGLE-00392852 | GOOGLE-00393223 - GOOGLE-00393238 | GOOGLE-00395759 - GOOGLE-00395776 | GOOGLE-00395985                   |
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| GOOGLE-00392861 - GOOGLE-00392879 | GOOGLE-00393343 - GOOGLE-00393357 | GOOGLE-00395783                   | GOOGLE-00395989 - GOOGLE-00396007 |
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| GOOGLE-00392905 - GOOGLE-00392909 | GOOGLE-00395091 - GOOGLE-00395146 | GOOGLE-00395824 - GOOGLE-00395833 | GOOGLE-00396034 - GOOGLE-00396036 |
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| GOOGLE-00392924 - GOOGLE-00392928 | GOOGLE-00395188 - GOOGLE-00395210 | GOOGLE-00395837                   | GOOGLE-00396052 - GOOGLE-00396056 |
| GOOGLE-00392929 - GOOGLE-00392933 | GOOGLE-00395206                   | GOOGLE-00395838                   | GOOGLE-00396057                   |
| GOOGLE-00392934 - GOOGLE-00392938 | GOOGLE-00395207 - GOOGLE-00395248 | GOOGLE-00395839 - GOOGLE-00395840 | GOOGLE-00396058 - GOOGLE-00396059 |
| GOOGLE-00392939 - GOOGLE-00392951 | GOOGLE-00395207 - GOOGLE-00395290 | GOOGLE-00395841 - GOOGLE-00395869 | GOOGLE-00396060 - GOOGLE-00396075 |
| GOOGLE-00392952 - GOOGLE-00392957 | GOOGLE-00395249                   | GOOGLE-00395870 - GOOGLE-00395874 | GOOGLE-00396076 - GOOGLE-00396079 |
| GOOGLE-00392958 - GOOGLE-00392961 | GOOGLE-00395250                   | GOOGLE-00395875                   | GOOGLE-00396080                   |
| GOOGLE-00392962 - GOOGLE-00392965 | GOOGLE-00395251                   | GOOGLE-00395876                   | GOOGLE-00396081                   |
| GOOGLE-00392966 - GOOGLE-00392969 | GOOGLE-00395252 - GOOGLE-00395253 | GOOGLE-00395877                   | GOOGLE-00396082                   |
| GOOGLE-00392970 - GOOGLE-00392974 | GOOGLE-00395254 - GOOGLE-00395258 | GOOGLE-00395878 - GOOGLE-00395881 | GOOGLE-00396083                   |
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| GOOGLE-00392988 - GOOGLE-00392992 | GOOGLE-00395262 - GOOGLE-00395272 | GOOGLE-00395895 - GOOGLE-00395896 | GOOGLE-00396091 - GOOGLE-00396093 |
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| GOOGLE-00392998 - GOOGLE-00393001 | GOOGLE-00395600                   | GOOGLE-00395898                   | GOOGLE-00396095 - GOOGLE-00396098 |
| GOOGLE-00393002 - GOOGLE-00393005 | GOOGLE-00395601                   | GOOGLE-00395899                   | GOOGLE-00396099 - GOOGLE-00396116 |
| GOOGLE-00396119 - GOOGLE-00396128 | GOOGLE-00395602                   | GOOGLE-00395900                   | GOOGLE-00396117 - GOOGLE-00396118 |

Oracle America, Inc. v. Google, Inc.

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**Documents Produced by Google**

|   |   |   |   |
|---|---|---|---|
| GOOGLE-00396129                         | GOOGLE-01-00017222 - GOOGLE-01-00017227 | GOOGLE-01-00028522 - GOOGLE-01-00028523 | GOOGLE-01-00056184 - GOOGLE-01-00056187 |
| GOOGLE-00396130 - GOOGLE-00396131       | GOOGLE-01-00017250 - GOOGLE-01-00017251 | GOOGLE-01-00029329 - GOOGLE-01-00029330 | GOOGLE-01-00056184 - GOOGLE-01-00056202 |
| GOOGLE-00396132 - GOOGLE-00396145       | GOOGLE-01-00017298                      | GOOGLE-01-00029331 - GOOGLE-01-00029332 | GOOGLE-01-00056188 - GOOGLE-01-00056202 |
| GOOGLE-00396146                         | GOOGLE-01-00017299 - GOOGLE-01-00017365 | GOOGLE-01-00030050 - GOOGLE-01-00030054 | GOOGLE-01-00056539                      |
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| GOOGLE-00396160 - GOOGLE-00396177       | GOOGLE-01-00018240 - GOOGLE-01-00018242 | GOOGLE-01-00030890 - GOOGLE-01-00030891 | GOOGLE-01-00056695 - GOOGLE-01-00056697 |
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| GOOGLE-00396207 - GOOGLE-00396212       | GOOGLE-01-00018470 - GOOGLE-01-00018471 | GOOGLE-01-00030965 - GOOGLE-01-00030966 | GOOGLE-01-00057656 - GOOGLE-01-00057710 |
| GOOGLE-00396213 - GOOGLE-00396272       | GOOGLE-01-00018538                      | GOOGLE-01-00031229                      | GOOGLE-01-00062031 - GOOGLE-01-00062032 |
| GOOGLE-00396273 - GOOGLE-00396275       | GOOGLE-01-00018539 - GOOGLE-01-00018546 | GOOGLE-01-00031263 - GOOGLE-01-00031269 | GOOGLE-01-00062071                      |
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| GOOGLE-00396289 - GOOGLE-00396292       | GOOGLE-01-00019039 - GOOGLE-01-00019040 | GOOGLE-01-00035931 - GOOGLE-01-00035932 | GOOGLE-01-00062072 - GOOGLE-01-00062088 |
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| GOOGLE-01-00001252 - GOOGLE-01-00001253 | GOOGLE-01-00023889 - GOOGLE-01-00023890 | GOOGLE-01-00048486 - GOOGLE-01-00048505 | GOOGLE-01-00065647 - GOOGLE-01-00065653 |
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| GOOGLE-01-00004621                      | GOOGLE-01-00024599                      | GOOGLE-01-00048791                      | GOOGLE-01-00065722 - GOOGLE-01-00065723 |
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| GOOGLE-01-00004766 - GOOGLE-01-00004767 | GOOGLE-01-00024672 - GOOGLE-01-00024674 | GOOGLE-01-00048953 - GOOGLE-01-00048970 | GOOGLE-01-00066909                      |
| GOOGLE-01-00004804 - GOOGLE-01-00004806 | GOOGLE-01-00024675 - GOOGLE-01-00024716 | GOOGLE-01-00049780 - GOOGLE-01-00049784 | GOOGLE-01-00072883 - GOOGLE-01-00072896 |
| GOOGLE-01-00004847 - GOOGLE-01-00004848 | GOOGLE-01-00025329                      | GOOGLE-01-00049877                      | GOOGLE-01-00073281 - GOOGLE-01-00073282 |
| GOOGLE-01-00004974 - GOOGLE-01-00004978 | GOOGLE-01-00025330 - GOOGLE-01-00025334 | GOOGLE-01-00050232                      | GOOGLE-01-00075935 - GOOGLE-01-00075936 |
| GOOGLE-01-00004995 - GOOGLE-01-00005006 | GOOGLE-01-00025375 - GOOGLE-01-00025433 | GOOGLE-01-00050315 - GOOGLE-01-00050327 | GOOGLE-01-00076949 - GOOGLE-01-00076951 |
| GOOGLE-01-00006208 - GOOGLE-01-00006311 | GOOGLE-01-00025376 - GOOGLE-01-00025433 | GOOGLE-01-00050348 - GOOGLE-01-00050354 | GOOGLE-01-00080869                      |
| GOOGLE-01-00006313 - GOOGLE-01-00006330 | GOOGLE-01-00025454 - GOOGLE-01-00025457 | GOOGLE-01-00050348 - GOOGLE-01-00050361 | GOOGLE-01-00081161                      |
| GOOGLE-01-00006708                      | GOOGLE-01-00025468 - GOOGLE-01-00025472 | GOOGLE-01-00050588 - GOOGLE-01-00050592 | GOOGLE-01-00081703 - GOOGLE-01-00081704 |
| GOOGLE-01-00007464                      | GOOGLE-01-00025505 - GOOGLE-01-00025506 | GOOGLE-01-00051630 - GOOGLE-01-00051631 | GOOGLE-01-00081724                      |
| GOOGLE-01-00007465 - GOOGLE-01-00007484 | GOOGLE-01-00025523                      | GOOGLE-01-00051633 - GOOGLE-01-00051634 | GOOGLE-01-00081881                      |
| GOOGLE-01-00012978 - GOOGLE-01-00012983 | GOOGLE-01-00025575                      | GOOGLE-01-00051706 - GOOGLE-01-00051707 | GOOGLE-01-00082216                      |
| GOOGLE-01-00016596 - GOOGLE-01-00016615 | GOOGLE-01-00025575 - GOOGLE-01-00025587 | GOOGLE-01-00052293                      | GOOGLE-01-00082292 - GOOGLE-01-00082295 |
| GOOGLE-01-00016600                      | GOOGLE-01-00025576 - GOOGLE-01-00025587 | GOOGLE-01-00053329 - GOOGLE-01-00053330 | GOOGLE-01-00082299                      |
| GOOGLE-01-00016636 - GOOGLE-01-00016653 | GOOGLE-01-00025699                      | GOOGLE-01-00053346                      | GOOGLE-01-00084024                      |
| GOOGLE-01-00016726 - GOOGLE-01-00016728 | GOOGLE-01-00026169                      | GOOGLE-01-00053551                      | GOOGLE-01-00084746 - GOOGLE-01-00084748 |
| GOOGLE-01-00016729 - GOOGLE-01-00016732 | GOOGLE-01-00026598 - GOOGLE-01-00026602 | GOOGLE-01-00053552 - GOOGLE-01-00053591 | GOOGLE-01-00090929                      |
| GOOGLE-01-00016888 - GOOGLE-01-00016892 | GOOGLE-01-00026813 - GOOGLE-01-00026814 | GOOGLE-01-00053556                      | GOOGLE-01-00093736 - GOOGLE-01-00093756 |
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| GOOGLE-01-00017143 - GOOGLE-01-00017144 | GOOGLE-01-00027566                      | GOOGLE-01-00054219                      | GOOGLE-01-00112859 - GOOGLE-01-00112861 |
| GOOGLE-01-00017154                      | GOOGLE-01-00028065 - GOOGLE-01-00028073 | GOOGLE-01-00054673 - GOOGLE-01-00054674 | GOOGLE-01-00131959 - GOOGLE-01-00131962 |
| GOOGLE-01-00017221                      | GOOGLE-01-00028402 - GOOGLE-01-00028405 | GOOGLE-01-00056096 - GOOGLE-01-00056097 | GOOGLE-01-00131963 - GOOGLE-01-00131965 |
| GOOGLE-01-00136577 - GOOGLE-01-00136578 | GOOGLE-01-00028497                      | GOOGLE-01-00056098 - GOOGLE-01-00056105 | GOOGLE-01-00134769                      |

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|   |                                   |                 |                                   |
|---|-----------------------------------|-----------------|-----------------------------------|
| GOOGLE-01-00137031 - GOOGLE-01-00137032 | GOOGLE-03169620                   | GOOGLE-03173277 | GOOGLE-03173326                   |
| GOOGLE-01-00137301 - GOOGLE-01-00137305 | GOOGLE-03169621                   | GOOGLE-03173278 | GOOGLE-03173327                   |
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| GOOGLE-02-00004627 - GOOGLE-02-00004628 | GOOGLE-03169624                   | GOOGLE-03173281 | GOOGLE-03173330                   |
| GOOGLE-02-00010504 - GOOGLE-02-00010510 | GOOGLE-03169625                   | GOOGLE-03173282 | GOOGLE-03173331                   |
| GOOGLE-02-00020474 - GOOGLE-02-00020475 | GOOGLE-03169626 - GOOGLE-03169628 | GOOGLE-03173283 | GOOGLE-03173332                   |
| GOOGLE-02-00028118 - GOOGLE-02-00028121 | GOOGLE-03169629                   | GOOGLE-03173284 | GOOGLE-03173333                   |
| GOOGLE-02-00038403 - GOOGLE-02-00038404 | GOOGLE-03169630 - GOOGLE-03169711 | GOOGLE-03173285 | GOOGLE-03173334                   |
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| GOOGLE-03-00168213 - GOOGLE-03-00168214 | GOOGLE-03173263                   | GOOGLE-03173312 | GOOGLE-03173364                   |
| GOOGLE-03-00276320 - GOOGLE-03-00276323 | GOOGLE-03173264                   | GOOGLE-03173313 | GOOGLE-03173365                   |
| GOOGLE-03168864 - GOOGLE-03168878       | GOOGLE-03173265                   | GOOGLE-03173314 | GOOGLE-03173366                   |
| GOOGLE-03168954 - GOOGLE-03168955       | GOOGLE-03173266                   | GOOGLE-03173315 | GOOGLE-03173367                   |
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| GOOGLE-03169550 - GOOGLE-03169603       | GOOGLE-03173271                   | GOOGLE-03173320 | GOOGLE-03349736 - GOOGLE-03349757 |
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| GOOGLE-03169619                         | GOOGLE-03173275                   | GOOGLE-03173324 | GOOGLE-03349765                   |
| GOOGLE-03349768 - GOOGLE-03349772       | GOOGLE-03173276                   | GOOGLE-03173325 | GOOGLE-03349766 - GOOGLE-03349767 |



Oracle America, Inc. v. Google, Inc.

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|   |   |   |   |
|---|---|---|---|
| GOOGLE-03349773 - GOOGLE-03349774       | GOOGLE-10-00045449 - GOOGLE-10-00045497   | GOOGLE-17-00089404 - GOOGLE-17-00089408   | GOOGLE-24-00011104                      |
| GOOGLE-03349775 - GOOGLE-03349830       | GOOGLE-10-00045498 - GOOGLE-10-00045530   | GOOGLE-17-00095257 - GOOGLE-17-00095262   | GOOGLE-24-00011105 - GOOGLE-24-00011313 |
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| GOOGLE-03349832 - GOOGLE-03349892       | GOOGLE-10-00046409 - GOOGLE-10-00046410   | GOOGLE-17-00738457 - GOOGLE-17-00738460   | GOOGLE-24-00013701 - GOOGLE-24-00013712 |
| GOOGLE-03349893 - GOOGLE-03349949       | GOOGLE-10-00046844 - GOOGLE-10-00046847   | GOOGLE-21-00001369                        | GOOGLE-24-00013702 - GOOGLE-24-00013712 |
| GOOGLE-03349950 - GOOGLE-03350002       | GOOGLE-12-00000115                        | GOOGLE-21-00003352                        | GOOGLE-24-00013713                      |
| GOOGLE-03350003                         | GOOGLE-12-00000472 - GOOGLE-12-00000476   | GOOGLE-21-00003353                        | GOOGLE-24-00016512 - GOOGLE-24-00016514 |
| GOOGLE-03350004                         | GOOGLE-12-00000473 - GOOGLE-12-00000476   | GOOGLE-21-00005867 - GOOGLE-21-00005901   | GOOGLE-24-00017719                      |
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Oracle America, Inc. v. Google, Inc.

**DOCUMENTS CONSIDERED**

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**Documents Produced by Google**

|   |   |   |   |
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| GOOGLE-26-00007510 - GOOGLE-26-00007514 | GOOGLE-27-00002001 - GOOGLE-27-00002025 | GOOGLE-32-00010479 - GOOGLE-32-00010480   | GOOGLE-58-00005312 - GOOGLE-58-00005318   |
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**Documents Produced by Google**

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|   |   |   |
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**Documents Produced by Oracle**

|                                       |                                       |                                       |                                       |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| OAGOOGL0000052860 - OAGOOGL0000052861 | OAGOOGL0000139743 - OAGOOGL0000139757 | OAGOOGL0000150908                     | OAGOOGL0000357233                     |
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**DOCUMENTS CONSIDERED**

Exhibit 2

I was provided with access to a Relativity database of materials produced in this case. I reviewed the documents provided therein through keyword searches. The following list contains many of the documents I reviewed in that database, as well as other documents provided to me by counsel, though it should not be considered comprehensive.

**Documents Produced by Oracle**

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Oracle America, Inc. v. Google, Inc.

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**Documents Produced by Oracle**

|   |                                       |                                       |                                       |
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| OAGOOGL0008260232 - OAGOOGL0008260233   | OAGOOGL0013129181 - OAGOOGL0013129191 | OAGOOGL0022610976 - OAGOOGL0022610977 | OAGOOGL0100033923 - OAGOOGL0100033964 |
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**DOCUMENTS CONSIDERED**

Exhibit 2

I was provided with access to a Relativity database of materials produced in this case. I reviewed the documents provided therein through keyword searches. The following list contains many of the documents I reviewed in that database, as well as other documents provided to me by counsel, though it should not be considered comprehensive.

**Documents Produced by Oracle**

|                                       |                                       |   |                                       |
|---------------------------------------|---------------------------------------|---|---------------------------------------|
| OAGOOGL0100064127 - OAGOOGL0100064235 | OAGOOGL0100168443 - OAGOOGL0100168459 | OAGOOGL2000156581                       | OAGOOGL3000002853 - OAGOOGL3000002858 |
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| OAGOOGL0100072599 - OAGOOGL0100072613 | OAGOOGL0100168489 - OAGOOGL0100168489 | OAGOOGL2000179816 - OAGOOGL2000179828   | OAGOOGL3000002893 - OAGOOGL3000002895 |
| OAGOOGL0100072602                     | OAGOOGL0100200610 - OAGOOGL0100200614 | OAGOOGL2000179829 - OAGOOGL2000179833   | OAGOOGL3000002896 - OAGOOGL3000002902 |
| OAGOOGL0100072776 - OAGOOGL0100072837 | OAGOOGL0100200610 - OAGOOGL0100200623 | OAGOOGL2000179834 - OAGOOGL2000179836   |                                       |
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**DOCUMENTS CONSIDERED**

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**Sun/Oracle Native Documents**

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Credit Suisse valuation - cover email to Credit Suisse from Sutphin).pdf

Java Timeline - 1995-2015 (20Years).pdf

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**DOCUMENTS CONSIDERED**

Exhibit 2

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**Documents Produced by a Third Party**

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ASF00000434

ASF00000733 - AFS00000734

ASF00000755 - AFS00000756

ASF00002629

ASF00002665 - AFS00002669

ASF00003036 - AFS00003037

ASF00003210 - AFS00003213



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**DOCUMENTS CONSIDERED**

Exhibit 2

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**Depositions**

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Deposition of Aditya Kumar Agarwal, April 8, 2011 with Exhibits  
Deposition of Aditya Kumar Agarwal, May 10, 2012 with Exhibits  
Deposition of Dennis Allison, September 9, 2011 with Exhibits  
Deposition of Owen Astrachan, September 9, 2011 with Exhibits  
Deposition of David August, September 16, 2011 with Exhibits  
Deposition of Terrence Barr, December 9, 2015 with Exhibits  
Deposition of Joshua Bloch, July 8, 2011 with Exhibits  
Deposition of Daniel Bornstein, May 16, 2011 with Exhibits  
Deposition of Daniel Bornstein, July 22, 2011 with Exhibits  
Deposition of Daniel Bornstein, November 21, 2011 with Exhibits  
Deposition of Patrick Brady, July 21, 2011 with Exhibits  
Deposition of Timothy Bray, November 30, 2011 with Exhibits  
Deposition of Alan Brenner, December 15, 2015 with Exhibits  
Deposition of Rafael Camargo, September 8, 2011 with Exhibits  
Deposition of Eric Chu, April 28, 2011 with Exhibits  
Deposition of Leo Cizek, July 22, 2011 with Exhibits  
Deposition of Rachel Claflin, April 26, 2011 with Exhibits  
Deposition of Iain Cockburn, October 17, 2011 with Exhibits  
Deposition of Iain Cockburn, February 10, 2012 with Exhibits  
Deposition of Alan Cox, October 26, 2011 with Exhibits  
Deposition of Jack Davidson, September 9, 2011 with Exhibits  
Deposition of Robert Dewar, September 13, 2011 with Exhibits  
Deposition of John Duimovich, December 21, 2015 with Exhibits  
Deposition of Lawrence Ellison, August 12, 2011 with Exhibits  
Deposition of Nedim Fresko, May 10, 2011 with Exhibits  
Deposition of Craig Gering, July 20, 2011 with Exhibits  
Deposition of Anwar Ghuloum, December 9, 2015 with Exhibits

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**DOCUMENTS CONSIDERED**

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**Depositions**

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Deposition of Jonathan Gold, December 11, 2015 with Exhibits  
Deposition of Benjamin Goldberg, September 13, 2011 with Exhibits  
Deposition of Robert Griesemer, June 23, 2011 with Exhibits  
Deposition of Vineet Gupta, July 26, 2011 with Exhibits  
Deposition of Steven Harris, July 28, 2011 with Exhibits  
Deposition of Urs Hoelzle, November 24, 2015 with Exhibits  
Deposition of David Hofert, December 1, 2015 with Exhibits  
Deposition of Jeet Kaul, August 5, 2011 with Exhibits  
Deposition of James Kearl, March 26, 2012 with Exhibits  
Deposition of Douglas Kehring, July 28, 2011 with Exhibits  
Deposition of Peter Kessler, August 4, 2011 with Exhibits  
Deposition of Peter Kessler, February 16, 2012 with Exhibits  
Deposition of Erez Landau, September 14, 2011 with Exhibits  
Deposition of Bob Lee, August 3, 2011 with Exhibits  
Deposition of Gregory Leonard, October 28, 2011 with Exhibits  
Deposition of John Levine, September 15, 2011 with Exhibits  
Deposition of Felix Lin, December 14, 2015 with Exhibits  
Deposition of Felix Lin, December 18, 2015 with Exhibits  
Deposition of Tim Lindholm, September 7, 2011 with Exhibits  
Deposition of Hiroshi Lockheimer, December 8, 2015 with Exhibits  
Deposition of Peter Lord, July 22, 2011 with Exhibits  
Deposition of David Mazières, September 8, 2011 with Exhibits  
Deposition of Andrew McFadden, May 4, 2011 with Exhibits  
Deposition of Reto Meier, December 11, 2015 with Exhibits  
Deposition of Richard Miner, May 26, 2011 with Exhibits  
Deposition of John Mitchell, September 2, 2011 with Exhibits  
Deposition of John Mitchell, September 6, 2011 with Exhibits

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**DOCUMENTS CONSIDERED**

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**Depositions**

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Deposition of John Mitchell, September 7, 2011 with Exhibits  
Deposition of Daniel Morrill, July 12, 2011 with Exhibits  
Deposition of Geoffrey Morton, June 7, 2011 with Exhibits  
Deposition of Dipchand Nishar, September 8, 2011 with Exhibits  
Deposition of Larry Page, August 24, 2011 with Exhibits  
Deposition of John Pampuch, July 29, 2011 with Exhibits  
Deposition of Terence Parr, September 15, 2011 with Exhibits  
Deposition of Christopher Plummer, February 16, 2012 with Exhibits  
Deposition of Noel Poore, September 7, 2011 with Exhibits  
Deposition of Mark Reinhold, August 5, 2011 with Exhibits  
Deposition of Mark Reinhold, February 15, 2012 with Exhibits  
Deposition of Mike Ringhofer, December 2, 2015 with Exhibits  
Deposition of Lisa Ripley, April 14, 2011 with Exhibits  
Deposition of Hasan Rizvi, July 28, 2011 with Exhibits  
Deposition of John Rizzo, November 30, 2011 with Exhibits  
Deposition of John Rose, February 15, 2012 with Exhibits  
Deposition of Andrew Rubin, April 5, 2011 with Exhibits  
Deposition of Andrew Rubin, July 27, 2011, 30(b)(6) and Individual with Exhibits  
Deposition of Andrew Rubin, August 18, 2011 with Exhibits  
Deposition of Andrew Rubin, April 27, 2012 with Exhibits  
Deposition of Billy Rutledge, December 9, 2015 with Exhibits  
Deposition of Georges Saab, December 16, 2015 with Exhibits  
Deposition of Eric Schmidt, August 23, 2011 with Exhibits  
Deposition of Jonathan Schwartz, July 20, 2011 with Exhibits  
Deposition of Edward Screven, July 29, 2011, 30(b)(6) and Individual with Exhibits  
Deposition of Edward Senteno, November 18, 2015 with Exhibits  
Deposition of Steven Shugan, September 26, 2011 with Exhibits

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**DOCUMENTS CONSIDERED**

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**Depositions**

Deposition of Param Singh, June 23, 2011 with Exhibits  
Deposition of Donald Smith, November 20, 2015 with Exhibits  
Deposition of Brian Swetland, July 7, 2011 with Exhibits  
Deposition of Robert Vandette, September 7, 2011 with Exhibits  
Deposition of Mark Wayne, December 3, 2015 with Exhibits  
Deposition of Susan Wojcicki, August 31, 2011 with Exhibits  
Deposition of Hinkmond B. Wong, February 16, 2012 with Exhibits

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**Expert Reports**

Expert Report of Dr. Iain M. Cockburn Regarding Patent and Copyright Damages, May 20, 2011  
Opening Expert Report of John C. Mitchell Regarding Copyrights, July 29, 2011  
Opening Expert Report of Alan Purdy Regarding Copyrights, July 29, 2011, Revised August 18, 2011  
Opening Expert Report of Marc Visnick Regarding Copyrights, July 29, 2011  
Opening Expert Report of Dr. Owen Astrachan Regarding Copyrights, July 29, 2011  
Expert Report of Dennis Allison Regarding the Invalidity of U.S. Patent No. RE 38,104, August 8, 2011  
Expert Report of Dennis Allison Regarding the Invalidity of U.S. Patent No. 7,426,720, August 8, 2011  
Expert Report of Dr. Robert B.K. Dewar Regarding Invalidity of U.S. Patent No. 6,061,520, August 8, 2011  
Expert Report of Dr. John Levine Regarding Invalidity of U.S. Patent No. 6,910,205, August 8, 2011  
Expert Report of Dr. John Levine Regarding Invalidity of U.S. Patent No. 5,966,702, August 8, 2011  
Expert Report of Dr. David Mazières Regarding the Invalidity of U.S. Patent No. 6,125,447 Patent, August 8, 2011  
Expert Report of Dr. David Mazières Regarding the Invalidity of U.S. Patent No. 6,192,476 Patent, August 8, 2011  
Opening Expert Report of John C. Mitchell Regarding Patent Infringement, August 8, 2011  
Summary and Report of Erez Landau Regarding Infringement of U.S. Patent No. 7,426,720, August 8, 2011  
Summary and Report of Noel Poore Regarding Infringement of U.S. Patent Nos. 5,966,702 and 6,061,520, August 8, 2011  
Summary and Report of Robert (“Bob”) G. Vandette Regarding Infringement of U.S. Patent Nos. RE 38,104 and 6,910,205, August 8, 2011

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**DOCUMENTS CONSIDERED**

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**Expert Reports**

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Dr. John C. Mitchell's Report in Opposition to Dr. Owen Astrachan's Opening Expert Report Regarding Copyrights, August 12, 2011  
 Rebuttal Expert Report of Dr. Owen Astrachan Regarding Copyrights, August 12, 2011  
 Reply Expert Report of John C. Mitchell Regarding Copyrights, August 19, 2011  
 Reply Expert Report of Alan Purdy Regarding Copyrights, August 19, 2011  
 Reply to Dr. Mitchell's Opposition to Dr. Owen Astrachan's Opening Expert Report Regarding Copyrights, August 19, 2011  
 Expert Report of Dr. Jack W. Davidson Regarding the Non-Infringement of U.S. Patent No. 7,426,720, August 25, 2011  
 Expert Report of Dr. David Mazières Regarding Non-Infringement of U.S. Patent Nos. 6,125,447 and 6,129,476, August 25, 2011  
 Expert Report of Dr. Terence Parr Regarding Non-Infringement of U.S. Patent No. 6,061,520, August 25, 2011  
 Expert Report of Dr. Terence Parr Regarding Non-Infringement of U.S. Patent No. 5,966,702, August 25, 2011  
 Expert Report of Dr. Benjamin F. Goldberg Regarding Validity of Patents-in-Suit, August 25, 2011  
 Expert Reply Report of Dennis Allison Regarding the Invalidity of U.S. Patent No. RE 38,104, September 1, 2011  
 Expert Reply Report of Dennis Allison Regarding the Invalidity of U.S. Patent No. 7,426,720, September 1, 2011  
 Expert Reply Report of Dr. John Levine Regarding Invalidity of U.S. Patent Nos. 5,966,702 and 6,061,520, September 1, 2011  
 Expert Reply Report of Dr. David Mazières Regarding Invalidity of U.S. Patent Nos. 6,125,447 and 6,129,476, September 1, 2011  
 Reply Expert Report of John C. Mitchell Regarding Patent Infringement, September 1, 2011  
 Expert Report of Dr. Iain M. Cockburn Regarding Patent and Copyright Damages, September 12, 2011, Revised September 15, 2011  
 Expert Report of Dr. Steven M. Shugan Regarding Consumer Preferences for Smartphone Features, September 12, 2011  
 Supplemental Summary and Report of Erez Landau Regarding Infringement of U.S. Patent No. 7,426,720, September 12, 2011  
 Expert Report of Dr. Alan J. Cox Regarding Copyright Damages, October 3, 2011, Revised October 21, 2011, November 25, 2011, and April 15, 2012  
 Expert Report of Dr. Gregory K. Leonard Regarding Patent Damages, October 3, 2011, Revised October 24, 2011  
 Reply Expert Report of Dr. Iain M. Cockburn to the Expert Report of Dr. Alan J. Cox Regarding Copyright Damages, October 10, 2011  
 Reply Expert Report of Dr. Iain M. Cockburn to the Expert Report of Dr. Gregory K. Leonard Regarding Patent Damages, October 10, 2011  
 Expert Rebuttal Report of Dr. Kenneth Serwin to the Expert Report of Dr. Gregory Leonard Regarding Patent Damages, October 10, 2011  
 Expert Rebuttal Report of Dr. Kenneth Serwin to the Expert Report of Dr. Alan J. Cox Regarding Copyright Damages, October 10, 2011  
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**Exhibit 3****Oracle Timeline of Selected Events**

- Mid-nineties** Sun develops the Java platform for computer programming and releases it. At that time, the API included seven packages of pre-written programs.<sup>1</sup>
- 1996** At the first-ever JavaOne developer conference, more than 6,000 attendees gather to learn more about Java technology. According to Sun, “[w]ith a broad range of Java-related product announcements from Sun and other companies and an exhibit hall filled with more than 160 businesses displaying Java products and services, it appears that a whole new industry is growing around a language launched just a year earlier.”<sup>2</sup>
- 1997** “With approximately 400,000 developers working in Java, it is now the #2 programming language in the world. More than 10,000 developers flock to the second annual JavaOne developer conference, where Sun announces improved security and compatibility for Java and a range of licensees who plan to take Java beyond the desktop in futuristic devices such as smartcards.”<sup>3</sup>
- 1999** “Sun announces a redefined architecture for the Java platform that makes it simpler for software developers, service providers, and device manufacturers to target specific markets. According to Sun, “[w]ith the introduction of Java 2 Platform, Standard Edition (J2SE) for desktop and workstation devices; Java 2 Platform, Enterprise Edition (J2EE) for heavy-duty server systems; and Java 2 Platform, Micro Edition (J2ME) for consumer devices, it’s now easier to capitalize on the Java platform for a growing range of opportunities.”<sup>4</sup>
- 2004** According to Sun, “[a]t the JavaOne developer conference, the big debate is whether Java should be open sourced. Currently, Sun requires that projects officially based on Java be certified as compatible with the Java specification; amendments to Java must go through Java Community Process (JCP) procedures.”
- “Open source advocates seek a freer path for Java. During a panel discussion at JavaOne, representatives from IBM and the Apache Software Foundation endorse an open source model for Java, while Java creator and Sun Fellow James Gosling, along with Sun Vice President and Fellow Rob Gingell and Red Monk Analyst James Governor oppose the move. Gosling warns that allowing multiple, open source implementations of Java technologies could yield the incompatibilities that happened with Unix and is happening again with Linux distributions.”<sup>5</sup>

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<sup>1</sup> Java Timeline, 1995 – 2015, available at <http://oracle.com.edgesuite.net/timeline/java>; Trial Testimony of Mark Reinhold, Trial Transcript Vol. 3, April 18, 2012, p. 631.

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<sup>5</sup> Java Timeline, 1995 – 2015, available at <http://oracle.com.edgesuite.net/timeline/java>.

- 2005** Java celebrates its tenth anniversary with huge celebrations at the JavaOne developer conference and at Sun headquarters. Sun estimates Java now drives more than \$100 billion of business annually. It counts more than 4.5 million Java developers, 2.5 billion Java-enabled devices, and 1 billion Java technology-enabled smart cards. Analyst firm Ovum estimates that 708 million Java-enabled handsets were circulating by June 2005.<sup>6</sup>
- Jul 11, 2005** Google acquires Android Inc.<sup>7</sup> as part of its mobile strategy. At the time, Android was a 22-month old start up based in Palo Alto, California. The acquisition “brings to Google a wealth of talent, including co-founder Andy Rubin, who previously started mobile-device maker Danger Inc.”<sup>8</sup>
- 2005-2006** Shortly after Google acquired Android, Inc.,<sup>9</sup> Sun and Google engage in a series of negotiations, which Sun referred to as “Project Armstrong.”<sup>10</sup>
- Sep 2005** - Sun sends Google draft agreements for standard Java ME licenses; Google indicates it is seeking an approach that would allow an open-source implementation.<sup>11</sup>
- Oct 11, 2005** – “In October 2005, following “discussions with Sun regarding Android’s Open Source VM strategy,” Google’s then Senior Vice President, Andy Rubin, remarked in an e-mail, “If Sun doesn’t want to work with us, we have two options: 1) Abandon our work and adopt MSFT CLR VM and C# language – or – 2) Do Java anyway and defend our decision, perhaps making enemies along the way.”<sup>12</sup>
- In addition, Andy Rubin writes to Larry Page that Alan Brenner of Sun was concerned that “by open sourcing our J2ME VM we will make licensing ‘enforceability’ impossible for Sun – and he will lose revenue.”<sup>13</sup>
- Jan 2006** – Andy Rubin tells Sergey Brin and Larry Page that, in connection with the Android deal, Sun was “prepared to walk away from a \$100M annual J2ME licensing business into an open source business model.”<sup>14</sup> In other words, Google knew that Sun actually expected to lose hundreds of millions of dollars per year in turning to an open-source business model by licensing Java for use in Android.<sup>15</sup>
- Jan 2006** – “Google internally discussed a possible co-development partnership deal under which Java technology would become an open-source part of the Android platform. The deal was projected to cost Google \$25-50 million, plus a negotiable share of revenue from

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<sup>6</sup> Java Timeline, 1995 – 2015, available at <http://oracle.com.edgesuite.net/timeline/java>.

<sup>7</sup> Trial Exhibit 1061 at 131; see also, GOOGLE-01-00056184 – 202 at 195; Deposition of Andrew Rubin, April 5, 2011, p. 20.

<sup>8</sup> “Google Buys Android for Its Mobile Arsenal”, Bloomberg Businessweek, August 16, 2005.

<sup>9</sup> Deposition of Andrew Rubin, April 5, 2011, pp. 12-13.

<sup>10</sup> Project Armstrong: Business Model, February 2006, OAGOOGL0100166874 – 899.

<sup>11</sup> Email exchange between Leo Cizek and Andy Rubin, September 19, 2005, OAGOOGL0100167795 - 798 at 797.

<sup>12</sup> GOOGLE-01-00019527-528 at 528; Deposition of Andrew Rubin, April 5, 2011, p. 20.

<sup>13</sup> Email between Andy Rubin and Larry Page, October 11, 2005, GOOGLE-01-00019527 – 528 at 527.

<sup>14</sup> Email from Andy Rubin to Sergey Brin, et al., January 13, 2006, GOOGLE-26-00007930.

<sup>15</sup> Email from Eric Chu to Alan Brenner, et al., November 21, 2005, OAGOOGL0100072597; Deposition of Eric Chu, April 28, 2011, p. 50.

“platform-enabled mobile ads.” The record however, contains no evidence that Google actually proposed this idea to Sun.”<sup>16</sup>

**Feb. 8, 2006** – The first formal financial proposal made by Sun to Google – proposes “\$20 Million per year for 3 year” and “10% of revenue generated by Google on handsets running ‘Open Source Java Linux Mobile Platform’ or derivatives with a cap of \$25 Million a year (when and if google monetizes – then this becomes effective. We added the cap as per Rich’s request . . .)”<sup>17</sup> Google rejected Sun’s offer.<sup>18</sup>

**Apr. 27, 2006** – Email from Jonathan Schwartz of Sun to Eric Schmidt of Google indicating that “[m]y team has alerted me that our negotiations to jointly create a Java-Linux mobile platform are at an impasse.”<sup>19</sup>

- Jan. 2007** Apple introduces the iPhone.
- Apr. 2007** Sun acquires SavaJe, a Java-based smartphone platform, for an estimated \$13.2M.<sup>20</sup>
- June 2007** The iPhone is first available for sale.
- Nov. 2007** Google publicly announces the Android platform.<sup>21</sup>
- 2008** Google and Sun engage in additional discussions regarding a license.<sup>22</sup>
- Nov. 2008** Google releases Android and launches the Android phone.<sup>23</sup>
- Mar. 2009** Larry Ellison sends Sun’s Board of Directors an offer to acquire certain pieces of Sun’s business.<sup>24</sup>
- Apr. 19 2009** Oracle and Sun enter into the 2010 Sun/Oracle Merger.<sup>25</sup>
- Jan. 2010** Oracle acquires Sun and renames it Oracle America, Inc.<sup>26</sup>
- May 2010** Google TV, Google’s first attempt to create a TV platform based on Android, is announced on several devices, such as Sony Internet TV and the Logitech Revue, a set-top box device.<sup>27</sup>

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<sup>16</sup> Order Granting In Part Motion to Strike Damages Report of Plaintiff Expert Iain Cockburn, July 22, 2011, p. 3.

<sup>17</sup> Email from Vineet Gupta to Andy Rubin, February 8, 2006, OAGOOGL0000357494.

<sup>18</sup> OAGOOGL0000358110 ..

<sup>19</sup> Email from Jonathan Schwartz to Eric Schmidt, et al., April 27, 2006, GOOGLE-66-00000274.

<sup>20</sup> OAGOOGL0000424812 – 813 at 812; OAGOOGL0002304236-243 at 237.

<sup>21</sup> Order Granting In Part Motion to Strike Damages Report of Plaintiff Expert Iain Cockburn, July 22, 2011, p. 3.

<sup>22</sup> Deposition of Andrew Rubin, April 5, 2011, p. 14.

<sup>23</sup> Deposition of Andrew Rubin, April 5, 2011, p. 14. (But see, T-Mobile Unveils the T-Mobile G1 – the First Phone Powered by Android, [http://www.t-mobile.com/company/PressReleases\\_Article.aspx?assetName=Prs\\_Prs\\_20080923](http://www.t-mobile.com/company/PressReleases_Article.aspx?assetName=Prs_Prs_20080923) which indicates October 2008).

<sup>24</sup> OAGOOGL0000140115-130.

<sup>25</sup> Sun 2009 Form 10-K, p. 3.

<sup>26</sup> <http://www.bloomberg.com/research/stocks/private/snapshot.asp?privcapId=34903>

<sup>27</sup> <https://googleblog.blogspot.com/2010/05/announcing-google-tv-tv-meets-web-web.html>;  
<http://www.engadget.com/2010/06/18/logitech-revue-gets-official-google-tv-companion-box-coming-thi/>;  
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- Aug 6, 2010** Rubin receives an internal (Google) email stating that the technical alternatives to using Java for Android “all suck” and stating “We conclude that we need to negotiate a license for Java under the terms we need.”<sup>28</sup>
- Aug 12, 2010** Oracle files its initial complaint in this action.<sup>29</sup>
- Oct. 28, 2010** According to the Supplemental Complaint, from this date “Google has continued to infringe Oracle’s copyrights in the Java platform. Since then, Google has released seven versions of Android:
- Gingerbread (released December 2010);
  - Honeycomb (released February 2011);
  - Ice Cream Sandwich (released October 2011);
  - Jelly Bean (released July 2012)
  - KitKat (released October 2013); and
  - Lollipop (released November 2014).<sup>30</sup>
  - Marshmallow (released October 5, 2015).<sup>31</sup>

“These six named Android releases comprise approximately 40 major and minor releases of Android. . . . As with the previous versions of Android, these six Android releases copy thousands of lines of source code from the Java platform, as well as the structure, sequence and organization (“SSO”) of that platform as reflected in the asserted 37 Java API packages.”<sup>32</sup>

According to the Supplemental Complaint:

- Android will still not work without these Java API packages.”<sup>33</sup>
- Since Oracle filed the Amended Complaint in October 2010, Android has become the most widely used mobile platform in the world.<sup>34</sup>
- There are over one billion active monthly Android users and more than 8,000 different devices running versions of Android.<sup>35</sup>
- Users have downloaded more than 50 billion applications from Google Play on a catalog of more than 1.5 million apps.<sup>36</sup>

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<sup>28</sup> Trial Exhibit 10 – GOOGLE-12-10000022; GOOGLE-12-00039565; Deposition of Tim Lindholm, September 7, 2011, p. 102.

<sup>29</sup> Complaint for Patent and Copyright Infringement, August 12, 2010.

<sup>30</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 1.

<sup>31</sup> <http://www.pocket-lint.com/news/134946-when-is-android-6-0-marshmallow-coming-to-my-phone>.

<sup>32</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 1.

<sup>33</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 1.

<sup>34</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 2.

<sup>35</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 3.

<sup>36</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 3.

- Android use is also up as measured by advertising. By some accounts, Android is now the top mobile advertising platform as measured by total advertising revenue and by traffic.<sup>37</sup>

- Oct 2010** Google TV devices launch.<sup>38</sup>
- May 2011** Android hits 100 million activated Android devices.<sup>39</sup>
- May 2011** Google announces Android@Home, “a software framework for Android that allows programmers to interact with various connected appliances such as light bulbs, thermostats, washing machines and more,” at Google I/O.<sup>40</sup>
- Apr. 16, 2012** Trial begins in the matter of *Oracle v. Google*. The jury and court hear testimony from 24 witnesses.<sup>41</sup>
- May 7, 2012** The jury returned a verdict finding that Google infringed Oracle’s copyrights for the 37 asserted Java API packages and in the nine lines of the rangeCheck code. The jury deadlocked on Google’s fair use defense.<sup>42</sup>
- May 31, 2012** U.S. District Court for the Northern District of California issues preliminary decision finding “that the replicated elements of the Java API packages – including the declarations and their structure, sequence, and organization-were not copyrightable.”<sup>43</sup>
- Jun 20, 2012** The U.S. District Court for the Northern District of California enters final judgment in favor of Google and against Oracle on its claim for copyright infringement, except with respect to the rangeCheck function and the eight decompiled files.<sup>44</sup>
- 2012** Android cumulative activations exceed 500 million.<sup>45</sup>
- 2013** Android cumulative activations exceed 1 billion.<sup>46</sup>
- May 9, 2014** The United States Court of Appeals for the Federal Circuit (“CAFC”) issues opinion concluding “that the declaring code and the structure, sequence, and organization of the API packages are entitled to copyright protection.”<sup>47</sup> The CAFC reversed the U.S. District Court

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<sup>37</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 3, (reporting Android has three times the market share of mobile ad traffic as compared to its nearest competitor, iOS).

<sup>38</sup> <http://www.engadget.com/2010/10/06/logitech-revue-with-google-tv-details-299-for-keyboard-box-i/>; <http://www.cnet.com/products/sony-nxz-gt1-google-tv/>; <http://www.theverge.com/products/nsx-24gt1/2024>; <http://www.theverge.com/products/nsx-40gt1/2018>; <http://www.theverge.com/products/nsx-32gt1/2021>; <http://www.theverge.com/products/nsx-46gt1/2013>.

<sup>39</sup> <https://googleblog.blogspot.com/2011/05/android-momentum-mobile-and-more-at.html>.

<sup>40</sup> [http://www.pcworld.com/article/227611/Google\\_Envisions\\_Automated\\_Home\\_with\\_Android\\_Home.html](http://www.pcworld.com/article/227611/Google_Envisions_Automated_Home_with_Android_Home.html).

<sup>41</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1351 (Fed. Cir. 2014).

<sup>42</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1352 (Fed. Cir. 2014).

<sup>43</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1352 (Fed. Cir. 2014).

<sup>44</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1348 (Fed. Cir. 2014).

<sup>45</sup> GOOG-00022382.

<sup>46</sup> GOOG-00022382.

<sup>47</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339 at 1348 (Fed. Cir. 2014).

for the Northern District of California with instructions to reinstate the jury's infringement finding as to the 37 Java packages. The CAFC also granted "Oracle's motion for JMOL as to the eight decompiled Java files that Google copied into Android," and denied "Google's motion for JMOL with respect to the rangeCheck function."<sup>48</sup>

**Oct. 2014** Android TV, Google's successor Android-based platform to Google TV, is announced on the Nexus Player, a set-top box device.<sup>49</sup>

**2014** Android cumulative activations exceed 2 billion.<sup>50</sup>

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<sup>48</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339 at 1348 (Fed. Cir. 2014).

<sup>49</sup> Nexus Player is Google's first Android TV device, <http://www.theverge.com/2014/10/15/6982375/google-nexus-player-android-tv-set-top-box-announced>.

<sup>50</sup> GOOG-00022382.

*Oracle America, Inc. v. Google, Inc.***SUN MICROSYSTEMS INC R&D AS A PERCENT OF REVENUE**

Exhibit 4

|          | <b>Revenue</b>            | <b>R&amp;D</b>           | <b>R&amp;D as a Percent<br/>of Revenue</b> |
|----------|---------------------------|--------------------------|--|
| 1990 [1] | \$ 2,466,000,000          | \$ 302,000,000           | 12.2%                                      |
| 1991 [1] | 3,221,000,000             | 356,000,000              | 11.1%                                      |
| 1992 [1] | 3,589,000,000             | 382,000,000              | 10.6%                                      |
| 1993 [1] | 4,309,000,000             | 445,000,000              | 10.3%                                      |
| 1994 [1] | 4,690,000,000             | 455,000,000              | 9.7%                                       |
| 1995 [2] | 5,901,885,000             | 562,895,000              | 9.5%                                       |
| 1996 [2] | 7,094,751,000             | 653,044,000              | 9.2%                                       |
| 1997 [2] | 8,598,346,000             | 825,968,000              | 9.6%                                       |
| 1998 [3] | 9,862,000,000             | 1,029,000,000            | 10.4%                                      |
| 1999 [3] | 11,806,000,000            | 1,280,000,000            | 10.8%                                      |
| 2000 [4] | 15,721,000,000            | 1,630,000,000            | 10.4%                                      |
| 2001 [4] | 18,250,000,000            | 2,016,000,000            | 11.0%                                      |
| 2002 [4] | 12,496,000,000            | 1,832,000,000            | 14.7%                                      |
| 2003 [4] | 11,434,000,000            | 1,837,000,000            | 16.1%                                      |
| 2004 [4] | 11,185,000,000            | 1,926,000,000            | 17.2%                                      |
| 2005 [5] | 11,070,000,000            | 1,785,000,000            | 16.1%                                      |
| 2006 [5] | 13,068,000,000            | 2,046,000,000            | 15.7%                                      |
| 2007 [5] | 13,873,000,000            | 2,008,000,000            | 14.5%                                      |
| 2008 [5] | 13,880,000,000            | 1,834,000,000            | 13.2%                                      |
| 2009 [5] | 11,449,000,000            | 1,648,000,000            | 14.4%                                      |
| Total    | <u>\$ 193,963,982,000</u> | <u>\$ 24,852,907,000</u> | <u>12.8%</u>                               |

**Notes:**

[1] Sun Microsystems, Inc. SEC Form 10-K for the fiscal year ended June 30, 1994, Exhibit 13, p. 1.

[2] Sun Microsystems, Inc. SEC Form 10-K for the fiscal year ended June 30, 1997, Exhibit 11, p. 26.

[3] Sun Microsystems, Inc. SEC Form 10-K for the fiscal year ended June 30, 2002, p. 21.

[4] Sun Microsystems, Inc. SEC Form 10-K for the fiscal year ended June 30, 2004, p. 17.

[5] Sun Microsystems, Inc. SEC Form 10-K for the fiscal year ended June 30, 2009, p. 25.

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**ORACLE STATEMENT OF OPERATIONS**

Exhibit 5

| (in millions)   | <u>FY 2010 [1]</u> | <u>FY 2011 [1]</u> | <u>FY 2012 [1]</u> | <u>FY 2013 [2]</u> | <u>FY 2014 [2]</u> | <u>FY 2015 [2]</u> |
|---|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Revenues  |                    |                    |                    |                    |                    |                    |
| New Software Licenses                                 | \$ 7,533           | \$ 9,235           | \$ 9,906           | \$ 9,411           | \$ 9,416           | \$ 8,535           |
| Cloud Software as a Service and Platform as a Service | n/a                | n/a                | n/a                | 910                | 1,121              | 1,485              |
| Cloud Infrastructure as a Service                     | n/a                | n/a                | n/a                | 457                | 456                | 608                |
| Software License Updates and Product Support          | 13,092             | 14,796             | 16,210             | 17,142             | 18,206             | 18,847             |
| Software and Cloud Revenues                           | \$ 20,625          | \$ 24,031          | \$ 26,116          | \$ 27,920          | \$ 29,199          | \$ 29,475          |
| Hardware Systems Products                             | \$ 1,506           | \$ 4,382           | \$ 3,827           | \$ 3,033           | \$ 2,976           | \$ 2,825           |
| Hardware Systems Support                              | 784                | 2,562              | 2,475              | 2,313              | 2,396              | 2,380              |
| Hardware Systems Revenues                             | \$ 2,290           | \$ 6,944           | \$ 6,302           | \$ 5,346           | \$ 5,372           | \$ 5,205           |
| Services Revenues                                     | \$ 3,905           | \$ 4,647           | \$ 4,703           | \$ 3,914           | \$ 3,704           | \$ 3,546           |
| Total Revenues  | <u>\$ 26,820</u>   | <u>\$ 35,622</u>   | <u>\$ 37,121</u>   | <u>\$ 37,180</u>   | <u>\$ 38,275</u>   | <u>\$ 38,226</u>   |
| Operating Expenses                                    |                    |                    |                    |                    |                    |                    |
| Sales and Marketing                                   | \$ 5,080           | \$ 6,579           | \$ 7,127           | \$ 7,062           | \$ 7,567           | \$ 7,655           |
| Cloud Software as a Service and Platform as a Service | n/a                | n/a                | n/a                | 327                | 455                | 773                |
| Cloud Infrastructure as a Service                     | n/a                | n/a                | n/a                | 304                | 308                | 344                |
| Software License Updates and Product Support          | 1,063              | 1,264              | 1,226              | 1,175              | 1,162              | 1,199              |
| Hardware Systems Products                             | 880                | 2,057              | 1,843              | 1,501              | 1,521              | 1,471              |
| Hardware Systems Support                              | 423                | 1,259              | 1,046              | 890                | 836                | 816                |
| Services  | 3,398              | 3,818              | 3,743              | 3,182              | 2,954              | 2,929              |
| Research and Development                              | 3,254              | 4,519              | 4,523              | 4,850              | 5,151              | 5,524              |
| General and Administrative                            | 911                | 970                | 1,126              | 1,072              | 1,038              | 1,077              |
| Amortization of Intangible Assets                     | 1,973              | 2,428              | 2,430              | 2,385              | 2,300              | 2,149              |
| Acquisition Related and Other                         | 154                | 208                | 56                 | (604)              | 41                 | 211                |
| Restructuring   | 622                | 487                | 295                | 352                | 183                | 207                |
| Total Operating Expenses                              | <u>\$ 17,758</u>   | <u>\$ 23,589</u>   | <u>\$ 23,415</u>   | <u>\$ 22,496</u>   | <u>\$ 23,516</u>   | <u>\$ 24,355</u>   |
| Operating Income                                      | \$ 9,062           | \$ 12,033          | \$ 13,706          | \$ 14,684          | \$ 14,759          | \$ 13,871          |
| Operating Income %                                    | 33.8%              | 33.8%              | 36.9%              | 39.5%              | 38.6%              | 36.3%              |
| Interest Expense                                      | (754)              | (808)              | (766)              | (797)              | (914)              | (1,143)            |
| Non-Operating Income (Expense), net                   | (65)               | 186                | 22                 | 11                 | (141)              | 106                |
| Income Before Provision for Income Taxes              | \$ 8,243           | \$ 11,411          | \$ 12,962          | \$ 13,898          | \$ 13,704          | \$ 12,834          |
| Provision for Income Taxes                            | 2,108              | 2,864              | 2,981              | 2,973              | 2,749              | 2,896              |
| Net Income  | <u>\$ 6,135</u>    | <u>\$ 8,547</u>    | <u>\$ 9,981</u>    | <u>\$ 10,925</u>   | <u>\$ 10,955</u>   | <u>\$ 9,938</u>    |
| Net Income %  | 22.9%              | 24.0%              | 26.9%              | 29.4%              | 28.6%              | 26.0%              |

**Notes:**

[1] Oracle Annual Report, 10-K for fiscal year ended May 31, 2012, p. 85.

[2] Oracle Annual Report, 10-K for fiscal year ended May 31, 2015, p. 87.

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**GOOGLE ANNUAL STATEMENTS OF INCOME**

Exhibit 6

| (in millions)                                     | <u>2008 [1]</u>  | <u>2009 [2]</u>  | <u>2010 [2]</u>  | <u>2011 [2]</u>  | <u>2012 [3]</u>  | <u>2013 [3]</u>  | <u>2014 [3]</u>  |
|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Advertising Revenues                              |                  |                  |                  |                  |                  |                  |                  |
| Google Websites                                   | \$ 14,414        | \$ 15,723        | \$ 19,444        | \$ 26,145        | \$ 31,221        | \$ 37,422        | \$ 45,085        |
| Google Network Members Websites [4]               | 6,715            | 7,166            | 8,792            | 10,386           | 12,465           | 13,125           | 13,971           |
| Total Advertising Revenues                        | <u>21,129</u>    | <u>22,889</u>    | <u>28,236</u>    | <u>36,531</u>    | <u>43,686</u>    | <u>50,547</u>    | <u>59,056</u>    |
| Other Revenues [5]                                | <u>667</u>       | <u>762</u>       | <u>1,085</u>     | <u>1,374</u>     | <u>2,353</u>     | <u>4,972</u>     | <u>6,945</u>     |
| Total Revenue                                     | <u>\$ 21,796</u> | <u>\$ 23,651</u> | <u>\$ 29,321</u> | <u>\$ 37,905</u> | <u>\$ 46,039</u> | <u>\$ 55,519</u> | <u>\$ 66,001</u> |
| Cost and Expenses                                 |                  |                  |                  |                  |                  |                  |                  |
| Cost of Revenues                                  | \$ 8,622         | \$ 8,844         | \$ 10,417        | \$ 13,188        | \$ 17,176        | \$ 21,993        | \$ 25,691        |
| Research & Development                            | 2,793            | 2,843            | 3,762            | 5,162            | 6,083            | 7,137            | 9,832            |
| Sales and Marketing                               | 1,946            | 1,984            | 2,799            | 4,589            | 5,465            | 6,554            | 8,131            |
| General and Administrative                        | 1,803            | 1,668            | 1,962            | 2,724            | 3,481            | 4,432            | 5,851            |
| Charge - Resolution of DOJ Investigation          | -                | -                | -                | 500              | -                | -                | -                |
| Total Costs and Expenses                          | <u>\$ 15,164</u> | <u>\$ 15,339</u> | <u>\$ 18,940</u> | <u>\$ 26,163</u> | <u>\$ 32,205</u> | <u>\$ 40,116</u> | <u>\$ 49,505</u> |
| Income from Operations                            | \$ 6,632         | \$ 8,312         | \$ 10,381        | \$ 11,742        | \$ 13,834        | \$ 15,403        | \$ 16,496        |
| Impairment of Equity Investments                  | (1,095)          | -                | -                | -                | -                | -                | -                |
| Interest and other income, net                    | <u>316</u>       | <u>69</u>        | <u>415</u>       | <u>584</u>       | <u>635</u>       | <u>496</u>       | <u>763</u>       |
| Income from Continuing Ops Before IT <sup>1</sup> | \$ 5,854         | \$ 8,381         | \$ 10,796        | \$ 12,326        | \$ 14,469        | \$ 15,899        | \$ 17,259        |
| Provision for Income Taxes                        | <u>1,627</u>     | <u>1,861</u>     | <u>2,291</u>     | <u>2,589</u>     | <u>2,916</u>     | <u>2,552</u>     | <u>3,331</u>     |
| Net Income from Continuing Operations             | \$ 4,227         | \$ 6,520         | \$ 8,505         | \$ 9,737         | \$ 11,553        | \$ 13,347        | \$ 13,928        |
| Net Income (Loss) from Discontinued Ops           | <u>-</u>         | <u>-</u>         | <u>-</u>         | <u>-</u>         | <u>(816)</u>     | <u>(427)</u>     | <u>516</u>       |
| Net Income  | <u>\$ 4,227</u>  | <u>\$ 6,520</u>  | <u>\$ 8,505</u>  | <u>\$ 9,737</u>  | <u>\$ 10,737</u> | <u>\$ 12,920</u> | <u>\$ 14,444</u> |

**Notes:**

[1] Google Annual Report, 10-K for year ended December 31, 2008, pp. 42, 65.

[2] Google Annual Report, 10-K for year ended December 31, 2011, pp. 30, 52.

[3] Google Annual Report, 10-K for year ended December 31, 2014, pp. 23, 44.

[4] "Our revenues from Google Network Members' websites include revenues generated primarily through advertising programs including AdSense for search, AdSense for content, AdExchange, AdMob, and DoubleClick Bid Manager." Google Annual Report, 10-K for year ended December 31, 2014, p. 23.

[5] Other Revenues are mostly attributable to digital content products, such as apps, music, and movies on the Google Play store. See Google Annual Report, 10-K for year ended December 31, 2014, p. 24.

**SUMMARY OF ANDROID REPORTED OPERATING RESULTS**

Exhibit 7

| <i>(in millions)</i>                         | <u>2008 [1]</u> | <u>2009 [2]</u> | <u>2010 [3]</u> | <u>2011 [4]</u> | <u>2012 [4]</u> | <u>2013 [4]</u>  | <u>2014 [4]</u> | <u>2015 [4]</u> | <u>Total</u>      |
|--|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|-----------------|-----------------|-------------------|
| <b>Revenue</b>                               |                 |                 |                 |                 |                 |                  |                 |                 |                   |
| Ad Revenue [5]                               | \$0.7           | \$15.7          | \$120.1         | \$569.4         | \$2,152.4       | \$4,659.5        |                 |                 | \$28,957.1        |
| Apps   | 0.0             | 1.1             | 8.0             | 36.2            | 136.1           | 1,435.5          |                 |                 | 7,972.2           |
| Digital Content                              | 0.0             | 0.0             | 0.0             | 14.8            | 105.8           | 297.5            |                 |                 | 1,656.7           |
| Hardware                                     | 0.0             | 0.0             | 115.2           | 0.0             | 303.5           | 834.7            |                 |                 | 1,980.4           |
| Total Revenue                                | 0.7             | 16.8            | 243.3           | 620.4           | 2,697.8         | 7,227.2          |                 |                 | 40,566.4          |
| <b>Cost of Sales</b>                         |                 |                 |                 |                 |                 |                  |                 |                 |                   |
| Traffic Acquisition Costs [6]                | 0.2             | 2.9             | 41.3            | 113.7           | 433.1           | 856.6            |                 |                 | 4,821.8           |
| Apps   | 0.0             | 0.0             | 0.0             | 0.0             | 62.2            | 854.9            |                 |                 | 2,866.0           |
| Digital Content                              | 0.0             | 0.0             | 0.0             | 23.5            | 169.5           | 376.4            |                 |                 | 1,877.4           |
| Hardware                                     | 0.0             | 0.0             | 109.9           | -0.2            | 340.6           | 1,001.8          |                 |                 | 2,427.4           |
| Infrastructure & Other COS                   | 0.2             | 0.8             | 4.3             | 67.9            | 95.0            | 123.1            |                 |                 | 1,022.6           |
| Total Cost of Sales                          | 0.4             | 3.7             | 155.5           | 204.9           | 1,100.4         | 3,212.9          |                 |                 | 13,015.2          |
| Gross Profit                                 | \$0.3           | \$13.1          | \$87.8          | \$415.5         | \$1,597.4       | \$4,014.3        |                 |                 | \$27,551.2        |
| <b>Direct Operating Expenses</b>             |                 |                 |                 |                 |                 |                  |                 |                 |                   |
| Sales  | \$0.9           | \$3.2           | \$5.2           | \$16.3          | \$37.2          | \$42.5           |                 |                 | \$411.9           |
| Marketing                                    | 12.3            | 16.6            | 53.3            | 53.9            | 225.3           | 476.1            |                 |                 | 2,239.2           |
| PM   | 0.0             | 1.9             | 8.0             | 0.0             | 0.0             | 0.0              |                 |                 | 9.9               |
| Engineering (EngPM)                          | 86.3            | 41.2            | 99.7            | 192.3           | 380.4           | 464.6            |                 |                 | 2,633.6           |
| G&A  | 1.0             | 0.0             | 0.0             | 0.0             | 0.0             | 0.0              |                 |                 | 1.0               |
| Legal  | 0.0             | 2.1             | 32.2            | 160.5           | 113.7           | 132.6            |                 |                 | 988.3             |
| Other  | 0.0             | 0.0             | 0.0             | 0.0             | 0.1             | 0.7              |                 |                 | 0.8               |
| Total Expenses                               | \$100.5         | \$65.0          | \$198.4         | \$423.0         | \$756.7         | \$1,116.5        |                 |                 | \$6,284.7         |
| Product Contribution                         | <u>-\$100.2</u> | <u>-\$51.9</u>  | <u>-\$110.6</u> | <u>-\$7.5</u>   | <u>\$840.7</u>  | <u>\$2,897.8</u> |                 |                 | <u>\$21,266.5</u> |
| <i>Contribution Margin as % of Gross Rev</i> |                 |                 | <i>-45.5%</i>   | <i>-1.2%</i>    | <i>31.2%</i>    | <i>40.1%</i>     |                 |                 | <i>52.4%</i>      |

**Notes:**

[1] Android OC Quarterly Review - Q1 2009, GOOGLE-00303725 at 739.

[2] Android OC Quarterly Review - Q4 2010, October 12, 2010, GOOGLE-01-00053552 at 556.

[3] Android OC Quarterly Review - Q1 2011, May 03, 2011, GOOGLE-77-00053555 at 562.

[4] GOOG-00103813 - Android Profit and Loss for years 2011 to 2015, Q4 2015 amounts are Google forecasts.

[5] Exhibit 8.1.

[6] TAC for 2011 to 2015 from Exhibit 7.1.

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**CALCULATION OF ANDROID ESTIMATED NETWORK MEMBER TRAFFIC ACQUISITION COSTS**

Exhibit 7.1

| <i>(in millions)</i>                         | <u>2011 [1]</u>  | <u>2012 [2]</u>  | <u>2013 [2]</u>  | <u>2014 [2]</u>  | <u>2015 [3]</u> |
|--|------------------|------------------|------------------|------------------|-----------------|
| Google Total Ad Revenue                      | \$36,531.0       | \$43,686.0       | \$50,547.0       | \$59,056.0       | n/a             |
| Total Network Member TAC                     | <u>\$7,294.0</u> | <u>\$8,791.0</u> | <u>\$9,293.0</u> | <u>\$9,864.0</u> | <u>n/a</u>      |
| [4] Network Member TAC<br>as % of Ad Revenue | 20.0%            | 20.1%            | 18.4%            | 16.7%            | ██████          |
| Android Total Ad Revenue                     | \$569.4          | \$2,152.4        | \$4,659.5        | \$██████         | ██████          |
| Android Network Member TAC                   | <u>\$113.7</u>   | <u>\$433.1</u>   | <u>\$856.6</u>   | <u>██████</u>    | <u>██████</u>   |

**Notes:**

[1] Google 2011 Form 10-K, p. 30 and 33.

[2] Google 2014 Form 10-K, p. 23 and 26.

[3] Exhibit 7


[4] TAC for 2015 is ██████; Deposition of Jonathan Gold, December 11, 2015, p. 189.



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**ANDROID TOTAL REVENUE FROM 2008 TO 2015**

Exhibit 8

| <i>(in millions)</i> | <u>2008 [1]</u> | <u>2009 [2]</u> | <u>2010 [3]</u> | <u>2011 [4]</u> | <u>2012 [4]</u>   | <u>2013 [4]</u>   | <u>2014 [4]</u>   | <u>2015 [4]</u> | <u>Total</u>       |
|----------------------|-----------------|-----------------|-----------------|-----------------|-------------------|-------------------|---|-----------------|--------------------|
| Ads [5]              | \$ 0.7          | \$ 15.7         | \$ 120.1        | \$ 569.4        | \$ 2,152.4        | \$ 4,659.5        |  |                 | \$ 28,957.1        |
| App Sales            | N/A             | 1.1             | 8.0             | 36.2            | 136.1             | 1,435.5           |   |                 | 7,972.2            |
| Digital Content      | N/A             | -               | -               | 14.8            | 105.8             | 297.5             |   |                 | 1,656.7            |
| Hardware             | N/A             | -               | 115.2           | -               | 303.5             | 834.7             |   |                 | 1,980.4            |
| Total                | <u>\$ 0.7</u>   | <u>\$ 16.8</u>  | <u>\$ 243.3</u> | <u>\$ 620.4</u> | <u>\$ 2,697.8</u> | <u>\$ 7,227.2</u> |   |                 | <u>\$ 40,566.4</u> |

**Notes:**

[1] Android OC Quarterly Review - Q1 2009, GOOGLE-00303725 at 739.

[2] Android OC Quarterly Review - Q4 2010, October 12, 2010, GOOGLE-01-00053552 at 556.

[3] Android OC Quarterly Review - Q1 2011, May 03, 2011, GOOGLE-77-00053555 at 562.

[4] Android P&L, GOOG-00103813.

[5] Exhibit 8.1. 2015 Ad Revenue is annualized based on six months ending June 30, 2015.

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**ANDROID AD REVENUE FROM 2008 TO 2015**

Exhibit 8.1

| <i>(in millions)</i> | <u>2008 [1]</u> | <u>2009 [2]</u> | <u>2010 [3]</u> | <u>2011 [4]</u> | <u>2012 [5]</u>   | <u>2013 [5]</u>   | <u>2014 [5]</u> | <u>2015 [5] [6]</u> | <u>Total</u>       |
|----------------------|-----------------|-----------------|-----------------|-----------------|-------------------|-------------------|-----------------|---------------------|--------------------|
| Ads (General)        | \$ 0.7          | \$ 15.7         | \$ 120.1        | \$ 569.4        | \$ -              | \$ -              |                 |                     | \$ 705.9           |
| Search (AdWords)     | -               | -               | -               | -               | 1,444.9           | 3,021.7           |                 |                     | 18,862.2           |
| AdSense              | -               | -               | -               | -               | 238.6             | 424.9             |                 |                     | 2,001.0            |
| Display              | -               | -               | -               | -               | 468.9             | 1,212.9           |                 |                     | 7,388.0            |
| Total Ad Revenue     | <u>\$ 0.7</u>   | <u>\$ 15.7</u>  | <u>\$ 120.1</u> | <u>\$ 569.4</u> | <u>\$ 2,152.4</u> | <u>\$ 4,659.5</u> |                 |                     | <u>\$ 28,957.1</u> |

**Notes:**

[1] Android OC Quarterly Review - Q1 2009, GOOGLE-00303725 at 739.

[2] Android OC Quarterly Review - Q4 2010, October 12, 2010, GOOGLE-01-00053552 at 556.

[3] Android OC Quarterly Review - Q1 2011, May 03, 2011, GOOGLE-77-00053555 at 562.

[4] GOOG-00132625, tabs "Final - Legal" and Final -Backup" (Cell A19).

[5] Android Ad Revenues, GOOG-00022386.

[6] 2015 Ad revenue is annualized based on six months ending June 30, 2015.

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**ANDROID DEVICE WORLDWIDE ANNUAL UNIT SALES AS REPORTED BY GARTNER**

Exhibit 9

|                     | <u>2008</u> | <u>2009</u>   | <u>2010</u>    | <u>2011</u>     | <u>2012</u>     | <u>2013</u>     | <u>2014</u>       | <u>Annualized<br/>2015</u> | <u>Total</u>  |
|---------------------|-------------|---------------|----------------|-----------------|-----------------|-----------------|-------------------|----------------------------|---------------|
| Android Phones      | -           | 6,798,400 [1] | 67,224,500 [1] | 219,440,200 [2] | 451,621,000 [3] | 761,288,000 [4] | 1,004,675,000 [4] | 1,133,616,000 [5]          | 3,644,663,100 |
| Android Tablets     | -           | -             | 2,786,000 [6]  | 18,030,000 [6]  | 53,341,250 [7]  | 120,961,445 [7] | 154,700,000 [8]   | 139,800,000 [9]            | 489,618,695   |
| Total Android Units | -           | 6,798,400     | 70,010,500     | 237,470,200     | 504,962,250     | 882,249,445     | 1,159,375,000     | 1,273,416,000              | 4,134,281,795 |

**Notes:**

[1] <http://www.cnet.com/news/gartner-android-ranks-2nd-in-global-smartphones/>.

[2] [http://www.pcworld.com/article/228218/Gartner\\_Android\\_Dominates\\_Smartphone\\_Sales\\_Worldwide.html](http://www.pcworld.com/article/228218/Gartner_Android_Dominates_Smartphone_Sales_Worldwide.html); <http://www.computerweekly.com/news/2240105329/Worldwide-smartphone-sales-grow-74-in-second-quarter-of-2011-says-Gartner>; <http://www.winrumors.com/gartner-windows-phone-sales-flat-in-q3-2011/>;  
<http://www.gartner.com/newsroom/id/1924314>.

[3] <http://www.gartner.com/newsroom/id/2665715>.

[4] <http://www.gartner.com/newsroom/id/2996817>.

[5] <http://www.gartner.com/newsroom/id/3061917>; <http://www.gartner.com/newsroom/id/3115517>; <http://www.gartner.com/newsroom/id/3169417>; Annualized by estimating Q4 2015 to equal Q3 2015.

[6] <http://cluster006.ovh.net/~nobeyesco/nobeyscoweb/?q=node/948>.

[7] <http://the-digital-reader.com/2014/03/03/gartner-estimates-195-million-tablets-produced-2013-22-million-fewer-idcs-estimate/>.

[8] <http://venturebeat.com/2015/03/12/idc-tablet-shipment-growth-slows-to-a-crawl-will-grow-just-2-in-2015/>.

[9] <http://www.idc.com/getdoc.jsp?containerId=prUS25867215>; 2015 amounts provided as forecast for the entire year.

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## SMARTPHONE DEVICE WORLDWIDE ANNUAL UNIT SALES BY VENDOR

Exhibit 10

| Units           | 2003 [1]   | 2004 [1]   | 2005 [2]   | 2006 [2]   | 2007 [3]    | 2008 [3]    | 2009 [4]    | 2010 [4]    | 2011 [5]      | 2012 [6]      | 2013 [7]      | 2014 [7]      | Annualized<br>2015 [8] | Total         |
|-----------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|---------------|---------------|---------------|---------------|------------------------|---------------|
| Palm One        | 4,171,690  | 3,726,172  | 2,773,025  | 1,970,031  | -           | -           | -           | -           | -             | -             | -             | -             | -                      | 12,640,918    |
| Hewlett-Packard | 2,270,086  | 2,664,151  | 2,267,178  | 1,721,531  | -           | -           | -           | -           | -             | -             | -             | -             | -                      | 8,922,946     |
| RIM             | 604,521    | 2,178,000  | 3,193,000  | 3,510,927  | 11,767,700  | 23,149,000  | 36,445,233  | 47,782,003  | 49,159,250    | -             | -             | -             | -                      | 177,789,634   |
| Mio Technology  | -          | -          | 714,528    | 1,515,496  | -           | -           | -           | -           | -             | -             | -             | -             | -                      | 2,230,024     |
| Dell            | 582,020    | 693,126    | -          | -          | -           | -           | -           | -           | -             | -             | -             | -             | -                      | 1,275,146     |
| Sony Ericsson   | 1,404,289  | 480,648    | -          | -          | -           | -           | 4,925,031   | 9,954,584   | -             | -             | -             | -             | -                      | 16,764,552    |
| Sharp           | -          | -          | 536,540    | 1,428,318  | 6,885,300   | 5,234,200   | -           | -           | -             | -             | -             | -             | -                      | 14,084,358    |
| Nokia           | -          | -          | -          | -          | 60,465,000  | 60,920,500  | 66,980,427  | 99,545,839  | 74,364,189    | -             | -             | -             | -                      | 362,275,955   |
| Apple           | -          | -          | -          | -          | 3,302,600   | 11,417,500  | 24,625,157  | 47,782,003  | 89,660,316    | 130,133,200   | 150,786,000   | 191,426,000   | 200,386,500            | 849,519,275   |
| HTC             | -          | -          | -          | -          | 3,718,500   | 5,895,400   | 8,865,057   | 24,886,460  | 41,847,894    | -             | -             | -             | -                      | 85,213,310    |
| Samsung         | -          | -          | -          | -          | -           | -           | 6,895,044   | 23,891,001  | 90,429,932    | 205,767,100   | 299,795,000   | 307,597,000   | 320,368,900            | 1,254,743,977 |
| TCL Comm        | -          | -          | -          | -          | -           | -           | -           | -           | -             | -             | -             | -             | -                      | -             |
| Lenovo          | -          | -          | -          | -          | -           | -           | -           | -           | -             | 21,698,500    | 57,424,000    | 81,416,000    | 70,172,300             | 230,710,800   |
| LG Electronics  | -          | -          | -          | -          | -           | -           | 3,940,025   | 6,968,209   | -             | 25,814,100    | 46,432,000    | 57,661,000    | 15,428,000             | 156,243,334   |
| ZTE             | -          | -          | -          | -          | -           | -           | -           | -           | -             | -             | -             | -             | -                      | -             |
| Huawei          | -          | -          | -          | -          | -           | -           | -           | -           | -             | 27,168,700    | 46,609,000    | 68,081,000    | 98,452,400             | 240,311,100   |
| Motorola        | -          | -          | -          | -          | -           | -           | 6,895,044   | 13,936,417  | -             | -             | -             | -             | -                      | 20,831,461    |
| Yulong          | -          | -          | -          | -          | -           | -           | -           | -           | -             | -             | -             | -             | -                      | -             |
| Xiaomi          | -          | -          | -          | -          | -           | -           | -           | -           | -             | -             | -             | -             | 50,459,300             | 50,459,300    |
| Other           | 2,490,435  | 2,544,422  | 5,497,869  | 7,596,989  | 36,176,600  | 32,671,400  | 12,805,082  | 21,900,085  | 127,275,319   | 269,526,600   | 368,675,000   | 538,710,000   | 616,150,500            | 2,042,020,301 |
| Total           | 11,523,041 | 12,286,519 | 14,982,140 | 17,743,292 | 122,315,600 | 139,287,900 | 172,376,100 | 296,646,600 | 472,736,900   | 680,108,200   | 969,721,000   | 1,244,890,000 | 1,371,417,900          | 5,526,035,192 |
| Cumulative      | 11,523,041 | 23,809,560 | 38,791,700 | 56,534,992 | 178,850,592 | 318,138,492 | 490,514,592 | 787,161,192 | 1,259,898,092 | 1,940,006,292 | 2,909,727,292 | 4,154,617,292 | 5,526,035,192          |               |

**Notes:**[1] <http://www.palminfocenter.com/news/7613/gartner-worldwide-pda-shipments-grew-7-in-2004/>.[2] <http://www.gartner.com/newsroom/id/500898>.[3] <http://www.gartner.com/newsroom/id/910112>.[4] Units from [http://www.quirksmode.org/blog/archives/2011/02/smartphone\\_sale.html](http://www.quirksmode.org/blog/archives/2011/02/smartphone_sale.html) multiplied by 98.5% in 2009 and 99.5% in 2010 in order to reconcile the differences in unit totals between the 'by vendor' and 'by operating system' data in exhibits 10 and 11 [Total Units from Exhibit 11 / Total Units from source].[5] Units from <http://www.idc.com/getdoc.jsp?containerId=prUS23299912> multiplied by 96.2% in order to reconcile the differences in unit totals between the 'by vendor' and 'by operating system' data in exhibits 10 and 11 [Total Units from Exhibit 11 / Total Units from source].[6] <http://www.gartner.com/newsroom/id/2665715>.[7] <http://www.gartner.com/newsroom/id/2996817>.[8] <http://www.gartner.com/newsroom/id/3061917>; <http://www.gartner.com/newsroom/id/3115517>; <http://www.gartner.com/newsroom/id/3169417>; Annualized by estimating Q4 2015 to equal Q3 2015.

Oracle America, Inc. v. Google, Inc.

**SMARTPHONE DEVICE WORLDWIDE ANNUAL UNIT SALES BY OPERATING SYSTEM**

Exhibit 11

| Units      | 2003 [1]   | 2004 [1]   | 2005 [2]   | 2006 [2]   | 2007 [3]    | 2008 [3]    | 2009 [4]    | 2010 [4]    | 2011 [5]    | 2012 [6]    | 2013 [7]    | 2014 [7]      | Annualized<br>2015 [8] | Total         |
|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|------------------------|---------------|
| Windows CE | 4,344,186  | 5,283,203  | 7,173,005  | 9,954,082  | 14,698,000  | 16,498,100  | 15,031,000  | 12,378,200  | 9,843,400   | 16,940,700  | 30,714,000  | 35,133,000    | 28,217,000             | 206,207,877   |
| Palm OS    | 5,761,521  | 4,460,006  | 2,960,795  | 2,074,765  | 1,762,700   | 2,507,200   | -           | -           | -           | -           | -           | -             | -                      | 19,526,987    |
| RIM        | -          | -          | 3,193,000  | 3,510,927  | 11,767,700  | 23,149,000  | 34,346,600  | 47,451,600  | 51,541,900  | 34,210,300  | 18,606,000  | 7,911,000     | 4,432,000              | 240,120,027   |
| Symbian    | -          | -          | 1,010,000  | 950,100    | 77,684,000  | 72,933,500  | 80,878,300  | 111,576,700 | 88,410,200  | -           | -           | -             | -                      | 433,442,800   |
| iOS        | -          | -          | -          | -          | 3,302,600   | 11,417,500  | 24,889,700  | 46,598,300  | 89,263,300  | 130,133,200 | 150,786,000 | 191,426,000   | 200,387,000            | 848,203,600   |
| Android    | -          | -          | -          | -          | -           | -           | 6,798,400   | 67,224,500  | 219,440,200 | 451,621,000 | 761,288,000 | 1,004,675,000 | 1,133,616,000          | 3,644,663,100 |
| Other      | 1,417,334  | 2,543,309  | 645,340    | 1,253,418  | 13,100,700  | 12,782,600  | 10,432,100  | 11,417,400  | 14,238,000  | 47,203,000  | 8,327,000   | 5,745,000     | 4,764,900              | 133,870,101   |
| Total      | 11,523,041 | 12,286,519 | 14,982,140 | 17,743,292 | 122,315,600 | 139,287,900 | 172,376,100 | 296,646,600 | 472,736,900 | 680,108,200 | 969,721,000 | 1,244,890,000 | 1,371,417,900          | 5,526,035,192 |

**Notes:**

[1] Market Share from <http://www.palminfocenter.com/news/7613/gartner-worldwide-pda-shipments-grew-7-in-2004/> multiplied by Total Units from Exhibit 10.

[2] <http://www.gartner.com/newsroom/id/500898>.

[3] <http://www.gartner.com/newsroom/id/910112>.

[4] <http://www.cnet.com/news/gartner-android-ranks-2nd-in-global-smartphones/>.

[5] [http://www.pcworld.com/article/228218/Gartner\\_Android\\_Dominates\\_Smartphone\\_Sales\\_Worldwide.html](http://www.pcworld.com/article/228218/Gartner_Android_Dominates_Smartphone_Sales_Worldwide.html); <http://www.computerweekly.com/news/2240105329/Worldwide-smartphone-sales-grow-74-in-second-quarter-of-2011-says-Gartner>; <http://www.winumors.com/gartner-windows-phone-sales-flat-in-q3-2011/>; <http://www.gartner.com/newsroom/id/1924314>.

[6] <http://www.gartner.com/newsroom/id/2665715>.


[7] <http://www.gartner.com/newsroom/id/2996817>.

[8] <http://www.gartner.com/newsroom/id/3061917>; <http://www.gartner.com/newsroom/id/3115517>; <http://www.gartner.com/newsroom/id/3169417>; Annualized by estimating Q4 2015 to equal Q3 2015.

[9] The annualized 2015 unit total was adjusted by 1,000 units in order to reconcile the difference in unit totals between the 'by vendor' and 'by operating system' data in exhibits 10 and 11.

*Oracle America, Inc. v. Google, Inc.***CALCULATION OF JAVA ME LICENSING LOST PROFITS, 2009-2015**

Exhibit 12

|                                    | <u>2009</u>          | <u>2010</u>          | <u>2011</u>          | <u>2012</u>          | <u>2013</u>          | <u>2014</u>   | <u>2015</u> | <u>Total</u>          |
|------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---|-------------|-----------------------|
| [1] Lost Java ME Licensing Revenue | \$ 32,744,771        | \$ 39,741,318        | \$ 28,375,252        | \$ 14,329,644        | \$ 91,350,258        |  |             | \$ 557,661,673        |
| [2] Incremental Expenses           | 5,757,473            | 6,987,667            | 2,842,248            | 1,404,667            | 8,681,513            |   |             | 82,248,738            |
| Lost Java ME Licensing Profits     | <u>\$ 26,987,299</u> | <u>\$ 32,753,651</u> | <u>\$ 25,533,004</u> | <u>\$ 12,924,977</u> | <u>\$ 82,668,745</u> |   |             | <u>\$ 475,412,935</u> |

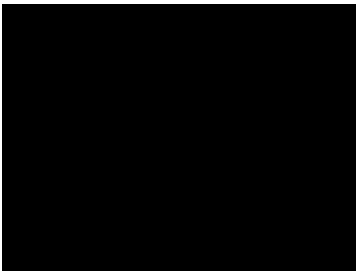
**Notes:**

[1] Exhibit 12.2.

[2] Exhibit 12.1.

*Oracle America, Inc. v. Google, Inc.***CALCULATION OF INCREMENTAL EXPENSES**

Exhibit 12.1

|                                 | <u>2009</u>         | <u>2010</u>         | <u>2011</u>         | <u>2012</u>         | <u>2013</u>         | <u>2014</u>   | <u>2015</u> | <u>Total</u>         |
|---------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---|-------------|----------------------|
| [1] Lost Java ME Revenue        | \$ 32,744,771       | \$ 39,741,318       | \$ 28,375,252       | \$ 14,329,644       | \$ 91,350,258       |  |             | \$ 557,661,673       |
| [2] Incremental COGS            | 7.6%                | 7.6%                | n/a                 | n/a                 | n/a                 |   |             | n/a                  |
| [2] Incremental Sales Expense   | 10.0%               | 10.0%               | n/a                 | n/a                 | n/a                 |   |             | n/a                  |
| [3] Incremental Expense % Total | 17.6%               | 17.6%               | 10.0%               | 9.8%                | 9.5%                |   |             | 14.7%                |
| Incremental Expenses            | <u>\$ 5,757,473</u> | <u>\$ 6,987,667</u> | <u>\$ 2,842,248</u> | <u>\$ 1,404,667</u> | <u>\$ 8,681,513</u> |   |             | <u>\$ 82,248,738</u> |

**Notes:**

[1] Exhibit 12.2.

[2] Exhibit 12.7, Applied 2006 COGS and Sales percentages to years 2009 and 2010.

[3] Exhibit 12.6.

*Oracle America, Inc. v. Google, Inc.***CALCULATION OF LOST JAVA ME LICENSING REVENUES**

Exhibit 12.2

|  | <u>2009</u>          | <u>2010</u>          | <u>2011</u>          | <u>2012</u>          | <u>2013</u>          | <u>2014</u> | <u>2015</u> | <u>Total</u>          |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|-------------|-------------|-----------------------|
| [1] Java ME Forecasted Licensing Revenue | \$ 129,696,000       | \$ 140,399,000       | \$ 151,985,252       | \$ 164,527,644       | \$ 178,105,082       |             |             | \$ 1,166,229,765      |
| [2] Java ME Licensing Revenue            | 96,951,229           | 100,657,682          | 123,610,000          | 150,198,000          | 86,754,824           |             |             | 608,568,092           |
| Lost Java ME Licensing Revenue           | <u>\$ 32,744,771</u> | <u>\$ 39,741,318</u> | <u>\$ 28,375,252</u> | <u>\$ 14,329,644</u> | <u>\$ 91,350,258</u> |             |             | <u>\$ 557,661,673</u> |

**Notes:**

[1] Exhibit 12.3.

[2] Exhibit 12.4.



*Oracle America, Inc. v. Google, Inc.*

**JAVA ME LICENSING REVENUE FORECASTS**

Exhibit 12.3

| <i>(in thousands)</i>                   | <u>2009 [1]</u> | <u>2010 [1]</u> | <u>2011 [2]</u> | <u>2012 [2]</u> | <u>2013 [2]</u> | <u>2014 [2]</u> | <u>2015 [2]</u> | <u>Total</u> |
|---|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|--------------|
| Total Forecasted Licensing Revenue      | \$ 129,696      | \$ 140,399      | \$ 151,985      | \$ 164,528      | \$ 178,105      | \$ 192,803      | \$ 208,714      | \$ 1,166,230 |
| 2009-2010 Java ME Licensing Growth Rate | <i>n/a</i>      | 8.3%            | 8.3%            | 8.3%            | 8.3%            | 8.3%            | 8.3%            | <i>n/a</i>   |

**Notes:**

[1] OAGOOGL0100164541.

[2] For 2011 forward, I applied the 2009-2010 growth rate to project licensing revenue.

*Oracle America, Inc. v. Google, Inc.*

**ACTUAL JAVA ME LICENSING REVENUE, 2009-2015**

Exhibit 12.4

|                                     | <u>2009 [1]</u>      | <u>2010 [1]</u>       | <u>2011 [2]</u>       | <u>2012 [2]</u>       | <u>2013 [2]</u>      | <u>2014 [2]</u>      | <u>2015 [2]</u>   | <u>Total</u>          |
|-------------------------------------|----------------------|-----------------------|-----------------------|-----------------------|----------------------|----------------------|-------------------|-----------------------|
| Java ME Licensing Revenue           | \$ 95,282,235        | \$ 98,922,651         | \$ 123,610,000        | \$ 150,198,000        | \$ 86,754,824        | \$ [REDACTED]        | [REDACTED]        | \$ 605,164,066        |
| Embedded ME Licensing Revenue       | <u>1,668,993</u>     | <u>1,735,032</u>      | <u>-</u>              | <u>-</u>              | <u>-</u>             | <u>-</u>             | <u>-</u>          | <u>3,404,025</u>      |
| Total Java ME Licensing Revenue     | <u>\$ 96,951,229</u> | <u>\$ 100,657,682</u> | <u>\$ 123,610,000</u> | <u>\$ 150,198,000</u> | <u>\$ 86,754,824</u> | <u>\$ [REDACTED]</u> | <u>[REDACTED]</u> | <u>\$ 608,568,092</u> |
| <i>Java ME Licensing YoY Growth</i> | <i>n/a</i>           | <i>3.8%</i>           | <i>22.8%</i>          | <i>21.5%</i>          | <i>-42.2%</i>        | [REDACTED]           | [REDACTED]        | <i>n/a</i>            |

**Notes:**

[1] OAGOOGL0000702509, tab 'Mapping'.

[2] OAGOOGL02000003713, tab 'Lic Revenue by Product'.

Oracle America, Inc. v. Google, Inc.

**SUMMARY OF ORACLE JAVA ME LICENSING FORECASTS, 2009-2015**

Exhibit 12.5

| <i>(in thousands)</i>              | October 8 2010 Forecast |            |           |           |            |            |            |            |
|------------------------------------|-------------------------|------------|-----------|-----------|------------|------------|------------|------------|
|                                    | 2009                    | 2010       | 2011      | 2012      | 2013       | 2014       | 2015 [5]   | Total      |
| [1] Java ME                        | \$ 129,696              | \$ 140,399 | \$ -      | \$ -      | \$ -       | \$ -       | \$ -       | \$ 270,095 |
| [2] Java ME Licensing              | -                       | -          | 85,000    | 95,200    | 119,000    | 148,750    | 185,938    | 633,888    |
| Embedded ME Licensing              | -                       | -          | 2,000     | 2,500     | 3,125      | 3,906      | 4,883      | 16,414     |
| Total Forecasted Licensing Revenue | \$ 129,696              | \$ 140,399 | \$ 87,000 | \$ 97,700 | \$ 122,125 | \$ 152,656 | \$ 190,820 | \$ 920,397 |
| Java ME Licensing YoY Growth       | <i>n/a</i>              | 8.3%       | -38.0%    | 12.3%     | 25.0%      | 25.0%      | 25.0%      | <i>n/a</i> |

| <i>(in thousands)</i>              | October 11 2010 Forecast |            |           |           |           |            |            |            |
|------------------------------------|--------------------------|------------|-----------|-----------|-----------|------------|------------|------------|
|                                    | 2009                     | 2010       | 2011      | 2012      | 2013      | 2014       | 2015 [5]   | Total      |
| [1] Java ME                        | \$ 129,696               | \$ 140,399 | \$ -      | \$ -      | \$ -      | \$ -       | \$ -       | \$ 270,095 |
| [3] Java ME Licensing              | -                        | -          | 85,000    | 87,550    | 94,554    | 108,737    | 125,048    | 500,889    |
| Embedded ME Licensing              | -                        | -          | 2,000     | 2,500     | 3,125     | 3,906      | 4,883      | 16,414     |
| Total Forecasted Licensing Revenue | \$ 129,696               | \$ 140,399 | \$ 87,000 | \$ 90,050 | \$ 97,679 | \$ 112,643 | \$ 129,930 | \$ 787,398 |
| Java ME Licensing YoY Growth       | <i>n/a</i>               | 8.3%       | -38.0%    | 3.5%      | 8.5%      | 15.3%      | 15.3%      | <i>n/a</i> |

| <i>(in thousands)</i>              | 2009       | 2010       | 2011      | 2012      | 2013      | 2014      | 2015 [5]   | Total      |
|------------------------------------|------------|------------|-----------|-----------|-----------|-----------|------------|------------|
| [1] Java ME                        | \$ 129,696 | \$ 140,399 | \$ -      | \$ -      | \$ -      | \$ -      | \$ -       | \$ 270,095 |
| [4] Java ME Licensing              | -          | -          | 66,331    | 71,514    | 78,363    | 86,357    | 95,165     | 397,730    |
| Embedded ME Licensing              | -          | -          | 8,873     | 8,873     | 10,204    | 11,734    | 13,495     | 53,178     |
| Total Forecasted Licensing Revenue | \$ 129,696 | \$ 140,399 | \$ 75,204 | \$ 80,387 | \$ 88,567 | \$ 98,091 | \$ 108,660 | \$ 721,004 |
| Java ME Licensing YoY Growth       | <i>n/a</i> | 8.3%       | -46.4%    | 6.9%      | 10.2%     | 10.8%     | 10.8%      | <i>n/a</i> |

**Notes:**

[1] OAGOOGL0100164541.

See "Strategic Forecast" scenario, at p. 3, for 2009-2010 forecasts. I have assumed that Java ME means licensing and possibly access fee revenue.

[2] OAGOOGL0000702509.

[3] OAGOOGL0000702677.

[4] OAGOOGL0002809491.

[5] 2015 estimated using growth rate from 2013 to 2014.

Oracle America, Inc. v. Google, Inc.

**ORACLE JAVA FINANCIALS, 2011-2015 [1]**

Exhibit 12.6

| <i>(in thousands)</i>            | <b>2011</b> | <b>2012</b> | <b>2013</b> | <b>2014</b> | <b>2015</b> | <b>Total</b> |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|--------------|
| Java Licensing                   |             |             |             |             |             |              |
| Revenue                          | \$ 250,194  | \$ 285,100  | \$ 316,061  |             |             | 1,206,853    |
| Expense                          | 25,061      | 27,947      | 30,037      |             |             | 139,812      |
| <i>Expense as a % of Revenue</i> | 10.0%       | 9.8%        | 9.5%        |             |             | 11.6%        |
| Margin                           | \$ 225,133  | \$ 257,153  | \$ 286,024  |             |             | 1,067,040    |
| <i>Margin as a % of Revenue</i>  | 90.0%       | 90.2%       | 90.5%       |             |             | 88.4%        |
| Java Consulting                  |             |             |             |             |             |              |
| Revenue                          | \$ 4,616    | \$ 7,808    | \$ 6,755    |             |             | 26,822       |
| Expense                          | 7,775       | 6,745       | 6,286       |             |             | 28,915       |
| <i>Expense as a % of Revenue</i> | 168.4%      | 86.4%       | 93.1%       |             |             | 107.8%       |
| Margin                           | \$ (3,159)  | \$ 1,063    | \$ 469      |             |             | (2,093)      |
| <i>Margin as a % of Revenue</i>  | -68.4%      | 13.6%       | 6.9%        |             |             | -7.8%        |
| Java Total                       |             |             |             |             |             |              |
| Revenue                          | \$ 254,810  | \$ 292,908  | \$ 322,816  |             |             | 1,233,675    |
| Expense                          | 32,836      | 34,692      | 36,323      |             |             | 168,727      |
| <i>Expense as a % of Revenue</i> | 12.9%       | 11.8%       | 11.3%       |             |             | 13.7%        |
| Margin                           | \$ 221,974  | \$ 258,216  | \$ 286,493  |             |             | 1,064,947    |
| <i>Margin as a % of Revenue</i>  | 87.1%       | 88.2%       | 88.7%       |             |             | 86.3%        |

**Notes:**

[1] OAGOOGL2000003713.

*Oracle America, Inc. v. Google, Inc.*

**SUN 2006 JAVA ME PROFIT & LOSS [1]**

Exhibit 12.7

|  | <u>Q1</u>       | <u>Q2</u>       | <u>Q3</u>       | <u>Q4</u>        | <u>2006</u>      |
|--|-----------------|-----------------|-----------------|------------------|------------------|
| Revenue                                      | \$ 22,210       | \$ 22,838       | \$ 25,050       | \$ 28,151        | \$ 98,249        |
| COGS   | <u>1,408</u>    | <u>1,710</u>    | <u>2,161</u>    | <u>2,171</u>     | <u>\$ 7,450</u>  |
| <i>COGS as a % of Revenue</i>                | <i>6.3%</i>     | <i>7.5%</i>     | <i>8.6%</i>     | <i>7.7%</i>      | <i>7.6%</i>      |
| Gross Profit                                 | <u>20,802</u>   | <u>21,128</u>   | <u>22,889</u>   | <u>25,980</u>    | <u>90,799</u>    |
| <i>Gross Profit as a % of Revenue</i>        | <i>93.7%</i>    | <i>92.5%</i>    | <i>91.4%</i>    | <i>92.3%</i>     | <i>92.4%</i>     |
| Engineering                                  | 7,845           | 8,859           | 7,506           | 8,631            | 32,841           |
| Marketing                                    | 3,497           | 4,052           | 4,052           | 3,682            | 15,283           |
| Sales  | 2,221           | 2,284           | 2,505           | 2,815            | 9,825            |
| <i>Sales as a % of Revenue</i>               | <u>10%</u>      | <u>10%</u>      | <u>10%</u>      | <u>10%</u>       | <u>10%</u>       |
| Total Operating Expenses                     | 13,563          | 15,195          | 14,063          | 15,128           | 57,949           |
| Contribution Margin                          | <u>\$ 7,239</u> | <u>\$ 5,933</u> | <u>\$ 8,826</u> | <u>\$ 10,852</u> | <u>\$ 32,850</u> |
| <i>Contribution Margin as a % of Revenue</i> | <i>32.6%</i>    | <i>26.0%</i>    | <i>35.2%</i>    | <i>38.5%</i>     | <i>33.4%</i>     |

**Notes:**

[1] OAGOOGL0005039944 - 962, at 946.

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**JAVA CLIENT P&L/FORECAST, 2007-2014 [1]**

Exhibit 12.8

| <i>(in millions)</i>                    | <u>Actual<br/>2007</u> | <u>Actual<br/>2008</u> | <u>Forecast<br/>2009</u> | <u>Forecast<br/>2010</u> | <u>Forecast<br/>2011</u> | <u>Forecast<br/>2012</u> | <u>Forecast<br/>2013</u> | <u>Forecast<br/>2014</u> | <u>Total</u> |
|---|------------------------|------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------|
| Java Client                             |                        |                        |                          |                          |                          |                          |                          |                          |              |
| Product Billings (Distribution)         | \$ 189                 | \$ 177                 | \$ 170                   | \$ 190                   | \$ 219                   | \$ 257                   | \$ 302                   | \$ 350                   | \$ 1,854     |
| Distribution                            | 30                     | 43                     | 80                       | 80                       | 80                       | 80                       | 80                       | 80                       | 553          |
| Total Product Billings                  | 219                    | 220                    | 250                      | 270                      | 299                      | 337                      | 382                      | 430                      | 2,407        |
| Total Services                          | -                      | -                      | -                        | -                        | -                        | -                        | -                        | -                        | -            |
| YoY Growth                              | <i>n/a</i>             | 1.0%                   | 13.6%                    | 8.0%                     | 10.7%                    | 12.7%                    | 13.4%                    | 12.6%                    | <i>n/a</i>   |
| Total                                   | 219                    | 220                    | 250                      | 270                      | 299                      | 337                      | 382                      | 430                      | 2,407        |
| Cost of Goods Sold                      | 20                     | 19                     | 29                       | 29                       | 35                       | 40                       | 44                       | 50                       | 266          |
| Cost of Goods Sold as a % of Billings   | 9.1%                   | 8.6%                   | 11.6%                    | 10.7%                    | 11.7%                    | 11.9%                    | 11.5%                    | 11.6%                    | 11.1%        |
| Product Gross Margin                    | 199                    | 201                    | 221                      | 241                      | 264                      | 297                      | 338                      | 380                      | 2,141        |
| Product Gross Margin as a % of Billings | 90.9%                  | 91.4%                  | 88.4%                    | 89.3%                    | 88.3%                    | 88.1%                    | 88.5%                    | 88.4%                    | 88.9%        |
| RDE                                     | 142                    | 117                    | 122                      | 122                      | 122                      | 121                      | 122                      | 122                      | 990          |
| RDE as a % of Billings                  | 64.8%                  | 53.2%                  | 48.8%                    | 45.2%                    | 40.8%                    | 35.9%                    | 31.9%                    | 28.4%                    | 41.1%        |
| Contribution Margin                     | \$ 57                  | \$ 84                  | \$ 99                    | \$ 119                   | \$ 142                   | \$ 176                   | \$ 216                   | \$ 258                   | \$ 1,151     |
| Contribution Margin % of Billings       | 26.0%                  | 38.2%                  | 39.6%                    | 44.1%                    | 47.5%                    | 52.2%                    | 56.5%                    | 60.0%                    | 47.8%        |

**Notes:**

[1] OAGOOGL0003973858.

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**SUMMARY OF JAVA LICENSING OPERATING COSTS, 2013-2015 [1]**

Exhibit 12.9

| <i>(in thousands)</i>                      | 2013        | 2014 | 2015 | Total        |
|--|-------------|------|------|--------------|
| Revenue                                    | \$ 315,997  |      |      | 671,454      |
| Salaries                                   | 12,994      |      |      | 39,726       |
| Commissions/Bonus                          | 7,382       |      |      | 19,480       |
| Benefits                                   | 3,889       |      |      | 11,679       |
| Travel and Entertainment                   | 2,646       |      |      | 6,359        |
| Total Employee Related Expense             | 26,910      |      |      | 77,244       |
| Documentation and Media                    | 2           |      |      | 15           |
| Facilities                                 | 971         |      |      | 3,071        |
| Profess and Recruiting Fees                | 225         |      |      | 370          |
| Miscellaneous                              | (158)       |      |      | 83           |
| Third Party Royalties and Referral Fees    | 0           |      |      | 0            |
| Computers, Voice and Data                  | 506         |      |      | 1,385        |
| Marketing Communications                   | 1,487       |      |      | 4,026        |
| External Contractor Costs                  | 51          |      |      | 47           |
| COGS                                       | 1           |      |      | 1            |
| New - Support Services Cost                | 4           |      |      | 5            |
| Resource Sharing Expense                   | -           |      |      | 0            |
| Eng Projects/Tooling /NRE                  | 43          |      |      | 45           |
| Total Other Operating Expenses             | 3,131       |      |      | 9,048        |
| Total Operating Expense                    | \$ 30,041   |      |      | 86,292       |
| <i>Operating Expense as a % of Revenue</i> | <i>9.5%</i> |      |      | <i>12.9%</i> |

**Notes:**

[1] OAGOOGL2000003715, tab 'OPEX and License Trend by Qtr'.

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**JAVA ME MARGINS, 2005-2011 [1]**

Exhibit 12.10

|  | <u>2005</u>          | <u>2006</u>          | <u>2007</u>          | <u>2008</u>          | <u>2009</u>          | <u>2010</u>          | <u>2011 [2]</u>     | <u>Total</u>          |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|-----------------------|
| Total Java ME Billings                   | \$ 51,372,066        | \$ 90,079,950        | \$ 109,853,211       | \$ 99,196,919        | \$ 97,654,250        | \$ 95,514,722        | \$ 12,353,593       | \$ 556,024,711        |
| Total Java ME Costs                      | <u>18,076,254</u>    | <u>19,646,798</u>    | <u>23,674,253</u>    | <u>22,177,130</u>    | <u>21,196,439</u>    | <u>21,661,190</u>    | <u>2,848,732</u>    | <u>129,280,795</u>    |
| <i>Java ME Costs as a % of Billings</i>  | <i>35.2%</i>         | <i>21.8%</i>         | <i>21.6%</i>         | <i>22.4%</i>         | <i>21.7%</i>         | <i>22.7%</i>         | <i>23.1%</i>        | <i>23.3%</i>          |
| <i>YoY Java ME Billings Growth</i>       | <i>n/a</i>           | <i>75.3%</i>         | <i>22.0%</i>         | <i>-9.7%</i>         | <i>-1.6%</i>         | <i>-2.2%</i>         | <i>n/a</i>          | <i>n/a</i>            |
| Java ME Margin                           | <u>\$ 33,295,812</u> | <u>\$ 70,433,152</u> | <u>\$ 86,178,958</u> | <u>\$ 77,019,789</u> | <u>\$ 76,457,811</u> | <u>\$ 73,853,532</u> | <u>\$ 9,504,862</u> | <u>\$ 426,743,916</u> |
| <i>Java ME Margin as a % of Billings</i> | <i>64.8%</i>         | <i>78.2%</i>         | <i>78.4%</i>         | <i>77.6%</i>         | <i>78.3%</i>         | <i>77.3%</i>         | <i>76.9%</i>        | <i>76.7%</i>          |

**Notes:**

[1] OAGOOGL0100167800.

[2] The data for 2011 only cover the first two months of the year.



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**WORLDWIDE AND U.S. AVERAGE QUARTERLY ANDROID ACTIVE DEVICES 2011 TO Q3 2015 [1]**

Exhibit 13

| <b>2011</b>   | <b>Q1</b>   | <b>Q2</b>   | <b>Q3</b>   | <b>Q4</b>   |
|---------------|-------------|-------------|-------------|-------------|
| Worldwide     |             |             |             |             |
| 1 Day Active  | n/a         | 34,992,314  | 46,532,375  | 65,362,805  |
| 7 Day Active  | n/a         | 39,765,306  | 53,137,135  | 75,183,084  |
| 30 Day Active | n/a         | 43,861,343  | 59,043,833  | 83,439,479  |
| U.S.          |             |             |             |             |
| 1 Day Active  | n/a         | 33,438,657  | 38,218,747  | 43,927,623  |
| 7 Day Active  | n/a         | 35,345,233  | 40,643,609  | 47,391,673  |
| 30 Day Active | n/a         | 38,213,405  | 44,346,758  | 51,831,126  |
| <b>2012</b>   | <b>Q1</b>   | <b>Q2</b>   | <b>Q3</b>   | <b>Q4</b>   |
| Worldwide     |             |             |             |             |
| 1 Day Active  | 92,873,866  | 119,842,961 | 159,626,230 | 210,592,088 |
| 7 Day Active  | 106,314,674 | 137,733,862 | 185,162,807 | 243,188,891 |
| 30 Day Active | 118,149,476 | 153,590,819 | 208,481,616 | 271,752,550 |
| U.S.          |             |             |             |             |
| 1 Day Active  | 51,887,807  | 56,122,314  | 61,244,147  | 66,580,660  |
| 7 Day Active  | 55,761,712  | 60,620,460  | 66,412,093  | 72,368,792  |
| 30 Day Active | 61,288,888  | 66,939,863  | 73,781,260  | 80,533,480  |
| <b>2013</b>   | <b>Q1</b>   | <b>Q2</b>   | <b>Q3</b>   | <b>Q4</b>   |
| Worldwide     |             |             |             |             |
| 1 Day Active  | 273,008,213 | 327,418,816 | 389,229,940 | 462,970,777 |
| 7 Day Active  | 315,358,630 | 379,862,824 | 454,640,556 | 540,439,669 |
| 30 Day Active | 352,417,625 | 425,955,145 | 513,855,987 | 609,728,349 |
| U.S.          |             |             |             |             |
| 1 Day Active  | 74,186,714  | 79,154,177  | 84,086,912  | 89,630,226  |
| 7 Day Active  | 80,798,867  | 86,481,545  | 92,101,347  | 98,096,607  |
| 30 Day Active | 90,182,817  | 96,623,684  | 103,506,196 | 109,462,499 |

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**WORLDWIDE AND U.S. AVERAGE QUARTERLY ANDROID ACTIVE DEVICES 2011 TO Q3 2015 [1]**

Exhibit 13

| <b>2014</b>   | <b>Q1</b>     | <b>Q2</b>     | <b>Q3</b>     | <b>Q4</b>     |
|---------------|---------------|---------------|---------------|---------------|
| Worldwide     |               |               |               |               |
| 1 Day Active  | 549,718,992   | 623,311,089   | 698,794,200   | 777,210,624   |
| 7 Day Active  | 644,423,936   | 732,828,044   | 825,638,442   | 920,308,003   |
| 30 Day Active | 729,626,040   | 832,458,580   | 944,999,606   | 1,052,499,975 |
| U.S.          |               |               |               |               |
| 1 Day Active  | 99,336,915    | 103,794,363   | 107,189,544   | 113,277,086   |
| 7 Day Active  | 109,400,723   | 115,014,584   | 118,818,874   | 125,216,654   |
| 30 Day Active | 122,891,172   | 130,686,992   | 134,773,832   | 141,489,790   |
| <b>2015</b>   | <b>Q1</b>     | <b>Q2</b>     | <b>Q3</b>     | <b>Q4</b>     |
| Worldwide     |               |               |               |               |
| 1 Day Active  | 819,679,543   | 882,831,753   | 935,564,392   | n/a           |
| 7 Day Active  | 982,791,460   | 1,067,157,974 | 1,128,226,129 | n/a           |
| 30 Day Active | 1,145,798,487 | 1,227,717,446 | 1,313,689,665 | n/a           |
| U.S.          |               |               |               |               |
| 1 Day Active  | 121,790,857   | 124,487,408   | 128,122,166   | n/a           |
| 7 Day Active  | 135,166,407   | 138,511,580   | 143,030,896   | n/a           |
| 30 Day Active | 153,394,387   | 157,579,560   | 164,020,710   | n/a           |

**Notes:**

[1] GOOG-00022382, all figures are quarterly averages.